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THE CESAREAN SCAR

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AS a result of obtaining at autopsy some interesting specimens of uteri that had been recently incised at cesarean section, our interest in the character and healing of the uterine incision has been greatly stimulated. So far as we know, very few observations have been made on the human uterus as regards the histologic changes that are taking place in early healing, and further, we are unaware of any experimental work which deals with the histologic study of the various stages of such healing in animals.

Holland mentions in his elaborate study on the rupture of cesarean scar that it is not often that cesarean cases come to postmortem, and it is even rare for cases to be reopened for hemorrhage or sepsis. When such cases are seen, he states that it is surprising how often there has been observed a yielding of the incision from loosening or cutting through of the sutures. He mentions that Wyss, Scheffzek, Boissard, Cristalli, and Le Page have studied some recent cases, but apparently these observations included the examination of the gross specimen, referring only to the gaping of the wound and to loosening and cutting through of the sutures. There were no remarks concerning the histologic study of this material.

The only references that we have obtained concerning early healing of the uterine wound are those of Couvelaire, Losee, and Gamble. Couvelaire described the process of early healing in the human uterus. He states that the cicatrix in the uterine muscle always leaves a conjunctive scar. The two layers of the wound are reunited by a band of fibrin. In two cases at autopsy, one hour after death, within five days after cesarean section, a band of fibrin had closed up the substratum of the conjunctive framework, which served as the basis of union between the various muscle bundles. Couvelaire's original publication was not obtainable and his description is from Audebert's quotation.

Lauvray, also quoted by Audebert, states that in the early healing, the lips of the wound have a serous effusion which brings them together. The fibrin of this

exudate is deposited in such a manner that its filaments fix themselves to the divided muscle bundles and connective tissue. The first framework of the union is thus formed. This framework becomes the substratum of the new cell formation and the future scar tissue is outlined. Finally there remains between the two lips of the old wound a sclerous tissue which looses the property of uterine tissue. However, he further states that there are some cases where the scarring becomes affected by primary intention, the scar being invisible to the eye when the uterus is examined in the course of a laparotomy or at autopsy.

Losee, in 1917, mentions the description of Couvelaire, and also described his impression of early healing. He states that in the clear wound after incision, leucocytes, red blood cells, fibrin, and later, young connective tissue cells separate the surfaces. These afterward are obliterated and eventually the muscle and fibrous tissue strands separating the bundles assume the relationship normally observed in other areas of the postpartum uterus. Other than a thickened peritoneum there is no scar tissue observed microscopically or macroscopically in the line of former incision when examined at a subsequent cesarean section operation, provided healing has occurred under normal conditions.
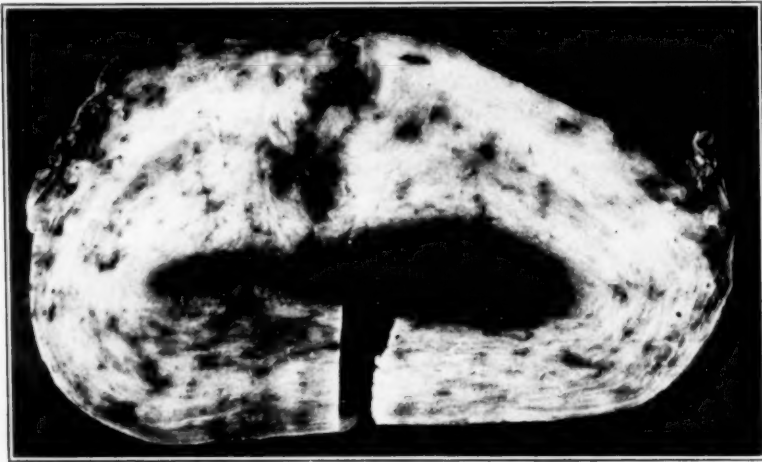
Fig. 1.—Ob. No. 3290. Five days after cesarean section. Gross specimen. Case 1. Shows line of incision through the upper and middle portion of the picture along the area of discoloration. Note the unusually good approximation of the wound.

Losee's descriptions are chiefly those of the late scar at subsequent cesarean section. Although he mentions this description of early healing, apparently it is not based on studies of early wounds. In the case of early incision with infection described by Gamble, a gas bacillus infection was so marked as to interfere definitely with healing, and therefore presents an unusual and exaggerated picture.

The late uterine scar obtained by hysterectomy at subsequent cesarean section has been frequently studied, and numerous observers have shown that many scars show definite thinning and are clearly defective. The defect on the inner surface is usually filled in by the endometrium. Also it is generally agreed that if the wound has properly healed through any considerable portion of its extent, that through such an area there is no evidence, either microscopically or

macroscopically, of the former line of incision. It is frequently stated that this is evidence of complete smooth muscle regeneration. In this country the observations of Losee and Gamble on the late scar, based on a study of twenty and twenty-one cases respectively, admirably bring out these characteristics of the scar at this stage. Actual rupture of the cesarean scar was placed by Holland at 4 per cent, which figure he obtained by a thorough study of the incidence of rupture scars, reporting ninety-seven cases collected from the literature and which included five of his own.

It is the opinion of these observers, with the exception of Gamble, who does not make any definite statement as to why the late uterine scar is imperceptible, that this condition must obtain as a result of smooth muscle regeneration. Audebert, describing such a so-called completely regenerated lesion in his case, disagrees with Couvelaire as regards the method of repair, and concludes that under similar

Fig. 2.—Ob. No. 3290. Five days after cesarean section. Low power microscopic section of entire thickness of uterine wall. A very slight gaping of the wound is seen in the right portion of the picture which represents the cavity side. Slight gaping on the peritoneal surface. Middle zone approximation good.

conditions smooth muscle regeneration and not the formation of a conjunctive scar is the usual process.

It has always been our opinion that the healing of the uterine wound should take place not differently than healing in smooth muscle elsewhere: for example, in an intestinal end-to-end anastomosis. It is well known that in an end-to-end anastomosis there is formed along the line of suture a considerable exudate which becomes organized as the result of marked proliferation of fibroblasts, which later contract and form between the muscle tissue an almost imperceptible scar. Descriptions and illustrations showing various stages of this process demonstrate that in the earlier stages there is marked separation of the muscle bundles, and as late as one month after, a definite linear scar, very thin, can still be made out between the edges of the mus-

cle. These steps are particularly well illustrated in Gould's monograph on abdominal operations.

On the other hand, Whittridge Williams states in his latest textbook discussing the cesarean scar, that the dictum "once a cesarean, always a cesarean" is an exaggeration and that it is based in part upon the belief that the uterine incision heals by formation of scar tissue, hence the term "cicatrix," and that the newly formed connective tissue stretches and sometimes yields when the uterus becomes distended. He states that such a belief is erroneous, as is shown in three ways:—First, inspection of the unopened uterus at the time of cesarean section usually shows no trace of former incision, or if present, it appears as an almost invisible linear scar; second, when the body of the uterus has been amputated no scar is visible after hard-
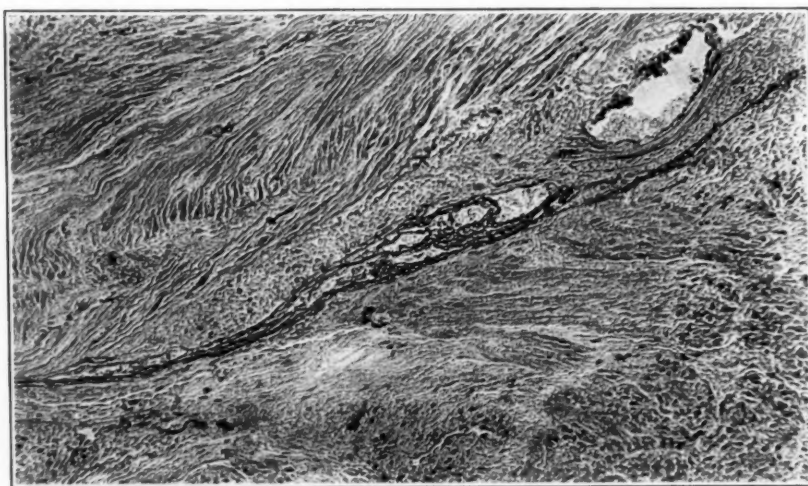
Fig. 3.—Ob. No. 3290. Five days after cesarean section. Shows the deposit of fibrin between the two cut edges of the muscle. There is a moderate amount of necrosis along the edges of the wound. No definite evidence of fibroblastic proliferation in this area.

ening, or at most, a shallow vertical furrow is present on the external and internal surfaces of the anterior wall, while between them no trace of scar tissue is present; third and most important, histologic examination of the site of incision shows that the uterus, just as all other organs made up of unstriated muscle, heals by regeneration of muscle fibers and not by scar tissue.

As the result of a study of two early incisions on human uteri, and on finding very little information in the literature concerning early healing, and in the lack of experimental work dealing with the healing of the uterine incision in postpartum animals, we felt that we could possibly by experiment show various stages in the healing of the uterine wound in animals which might throw some light on just what process was taking place in the uterus of the human after cesa-

rean section. Therefore, we decided to operate a series of pregnant guinea pigs at term and study the incision at various intervals following this procedure.

However, before taking up our findings in the early incision of the human uterus, as well as a series of experiments which we carried out on guinea pigs, we wish to mention briefly some work on smooth muscle regeneration in the uterus and intestines which has some bearing on our subject.

McCallum, in his textbook on pathology, states from experimental and other studies of healing of defects in smooth muscle, that there is very little activity in this region. Sometimes mitotic figures have been described and sometimes a new formation by amitotic division, but more recent studies tend to the idea that there is in higher vertebrates very little regeneration of muscle tissue, but that healing by scar tissue brings together the muscle edges at the site of defect. How-
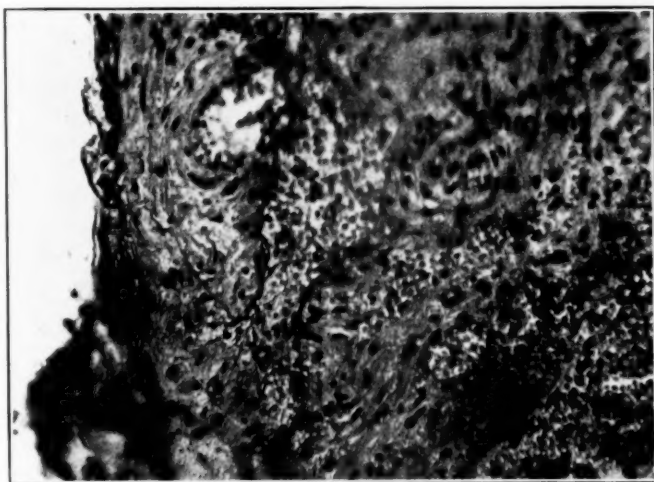
Fig. 4.—Ob. No. 3290. Five days after cesarean section. Shows fibrin deposit of wound at left, and toward the right proliferating fibrous tissue and new-formed blood vessels are seen.

ever, recent observations of Loeb and Walsh in a quantitative study on the regeneration in the uterus of epithelial, connective tissue and muscle tissue, show clearly that there is definite evidence of mitotic figures in the smooth muscle tissue as well as in the connective tissue, both after incision or compression by ligatures.

Loeb and Walsh conclude that mitosis in smooth muscle tissue is found between the fifth and eleventh days in the guinea pig, but only in specimens in which mitosis was also definitely present in the connective tissue. Also Loeb and Kuramitsu have shown that in the involution of the normal uterus in the guinea pig and rat, mitotic figures appear in smooth muscle layers during the first week of the puerperium, but are very rare after the first week. We shall return to this point later in discussing the scar in the guinea pig uterus.

As regards the regeneration of smooth muscle in the human uterus, the only evidence of such regeneration has been described by Berry, in 1921. Berry was able to demonstrate mitotic figures in the smooth muscle tissue of the uterus four days after perforation of the uterus by a curette. He found three mitotic figures

on an average in the high powered field, and as far as he is able to estimate, it is the only case on record where any question of regeneration of smooth muscle tissue is found in the human. He was able to confirm the work of Loeb and Walsh as regards mitotic figures in the uterus of experimental animals.

The only experimental work on the uterine scar which we know of is that of Mason and Williams, which was done in 1910 on the uterus of guinea pigs. These observers did no histologic work but merely tested the strength of the scar by distending the uterine muscle, including the scar, with weights attached. As the weights were increased the strip ruptured and rupture always took place outside the line of incision. These experiments, seven in number, were carried out from seven to ten weeks after the operation.

It is a well-known fact, and interesting to mention here, irrespective of the discussion of whether or not smooth muscle cells of the uterine wall regenerate in any considerable degree after labor, that in the uterus there is produced after each normal pregnancy a con-

Fig. 5.—Ob. No. 4594. Five days after cesarean section. Left portion of the picture shows uterine cavity. Note the definite defect in approximation which extends considerably into the uterine muscle. Note the close approximation throughout the middle and outer third. Line of incision is practically imperceptible through this area.

siderable new formation of smooth muscle tissue in the media of the blood vessels. This is particularly striking, as was first clearly described by Goodall, in the small vessels of the inner third of the uterus, where new vessels are found clearly sprouting in the lumen of the preexisting larger degenerating vessels. This work of Goodall has been confirmed by numerous observers subsequently, and is a striking example of the new formation of smooth muscle tissue.

The work which we wish to report in this paper consists of:—First, a description of three uterine incisions, two, five days after operation, and one, six days after; secondly, we wish to report our findings in a series of operations on the pregnant guinea pig near or at term; third, to compare our findings as regards healing of the incision with that which has been done by others on the late scar seen at subse-

quent cesarean section. We shall first give a brief outline of the history in the clinical cases and a description of the incision in each case.

CASE 1.—Ob. No. 5424. Colored female, age fifteen years. Grav. i. Entered hospital December 15, 1922, unconscious. Blood pressure 190/120. One pelvic examination made on admission, after proper preparation. The cervix was found to be 2 cm. in length and there was no dilatation. On admission there were 6¾ gm. albumin per liter and many granular casts in the urine. N. P. N. 35 mg. Uric acid 8.3 mg. With no improvement under conservative treatment after twenty-four hours a cesarean section was decided upon and a living child was obtained. After the operation blood pressure dropped to 95 systolic, from 160 systolic just before operation. The uterus was closed with one row of buried interrupted sutures, one buried running in character, and a third row of peritoneal Lembert sutures, all No. 2, 20-day catgut. The patient's temperature varied between 101° and 105° from admission to time of death six days after admission and five days after opera-
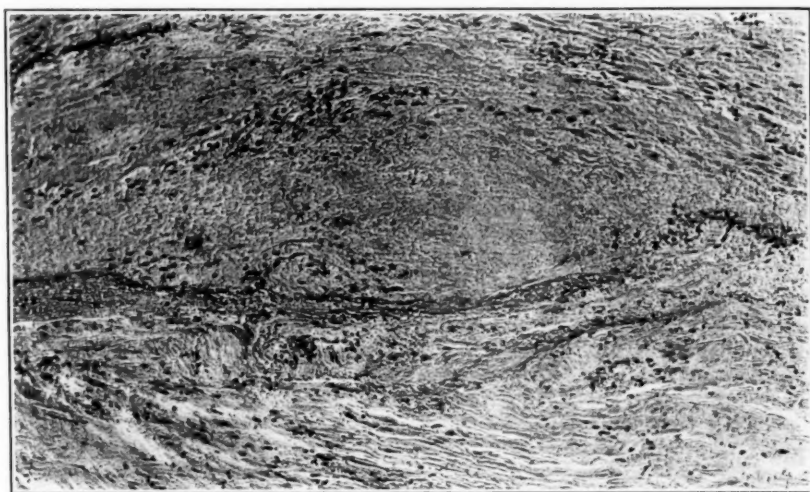
Fig. 6.—Ob. No. 4594. Five days after cesarean section. The line of incision at the juncture of the middle and outer third. Note the fibrinous deposit, also the marked necrosis with some proliferation of fibroblasts along the edge of the incision.

tion. At autopsy, with the exception of a very moderate change in the kidney tubules, there was no marked evidence of kidney damage. The liver also showed no typical findings of eclampsia. The peritoneum was congested around the abdominal wound and contained some fibrin, but glistened everywhere. The wound in the uterus was clean except for a slight exudate around one or two of the catgut sutures. Peritoneal cultures were negative. The cavity of the uterus contained a Gram-positive diplococci. On examination of the line of incision it was found to be intact everywhere. On cross section the wound was well approximated with the exception of a small amount of gaping along the inner surface for only 2 or 3 mm. There was a slight defect in the peritoneal surface but this was insignificant. We felt that the approximation in this case was everything that could be desired.

On histologic examination the line of incision could be readily followed through the section under low power. In the microscopic section on gross inspection it was with difficulty that the line of incision could be followed through the middle zone of the wall, owing to the unusually good approximation. The inner side of the

uterus was covered with fibrin, degenerated spongy decidua, considerable amount of blood, and polynuclear leucocytes. Several bacteria groups were also found with low power, which with the oil immersion could be made out clearly as cocci. Short chains of cocci were occasionally seen. These bacteria were not found along the line of incision, but were entirely limited to an area of superficial degenerating tissue. Microscopically, the wound is gaping slightly for about 0.5 cm., from inner margin, beginning with the musculature. There is a considerable amount of necrosis in the muscle tissue through this area, extending at least 3 mm. to each side. Leucocytic infiltration and hemorrhage are seen only in part of the area, in that part which is adjacent to the decidua. Where the edges of the wound begin to be closely applied a thick plug of fibrin is found between the edges. In one area particularly, there is a considerable number of fibroblasts along the line of incision and some new formed blood vessels. Also along the entire wound where there is good approximation this layer of fibrin is clearly made out, and in many places along the wound fibroblasts can be seen. Necrosis is found in the muscle tissue along the entire extent of the incision, less marked however than near the decidua.
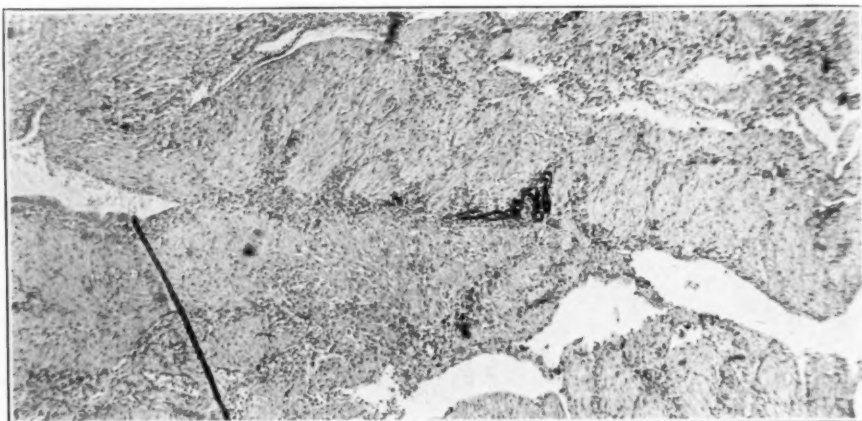
Fig. 7.—Guinea pig, No. 10. Seventeen hours after operation. Entire thickness of uterine wall at the line of incision. Note the endometrial lining at the left of the incision and the excellent approximation throughout the inner two-thirds. A group of included glands is seen in the line of incision at its middle. Separation of the outer two-fifths represents in part, artefact. The sides of the entire incision tract are covered with fibroblastic proliferation, with extensions from side to side between the muscle bundles.

Around the catgut sutures which are found in the section there is an unusually marked reaction characterized by an infiltration of numerous polymorphonuclear leucocytes, considerable necrosis, and some hemorrhage. This accounted for the exudate found along the line of incision in the gross description at autopsy. We felt very definitely that this reaction was sterile on account of the negative cultures and also on account of the fact that there were no bacteria in the sections at these points. Although fibroblasts were present in considerable numbers along the line of incision and between the adjacent muscle bundles as well, no evidence of smooth muscle regeneration could be made out. In this case, the case of eclampsia, the blood pressure stayed up around 130 until death, and, therefore, we felt the local changes in the uterus were not interfered with on account of the poor circulation or infection.

CASE 2.—Ob. No. 5879. Patient entered prenatal clinic with temperature of 103,° July 24, 1924. Grav. ix., and at term on September 22, 1924. A tentative

diagnosis of lobar pneumonia was made and the patient was immediately sent into the hospital. The case proved to be a case of chronic pulmonary tuberculosis with cavity formation, and a tuberculous bronchopneumonia. When it was clear that death was imminent, a cesarean section under local anesthesia was performed on August 12, 1924, and a living child weighing 2055 grams was obtained. The operation caused no immediate reaction, but the patient died five days after operation. The peritoneal findings at autopsy showed no evidence of peritonitis and there were slight fibrinous adhesions between the abdominal wound and the uterus. These were easily broken up. There was no fluid in the cavity. The uterus was large and extended above the symphysis, and there was a healing wound 6 cm. long extending along its anterior surface. This wound in the uterus on cross section was found to be very definitely defective in the inner third of the wall. There was a marked gap here which was filled in with leucocytes, red blood cells and fibrin. A few bacterial groups could be demonstrated very superficially, but no evidence of bacterial invasion of the uterine wall along the line of incision could
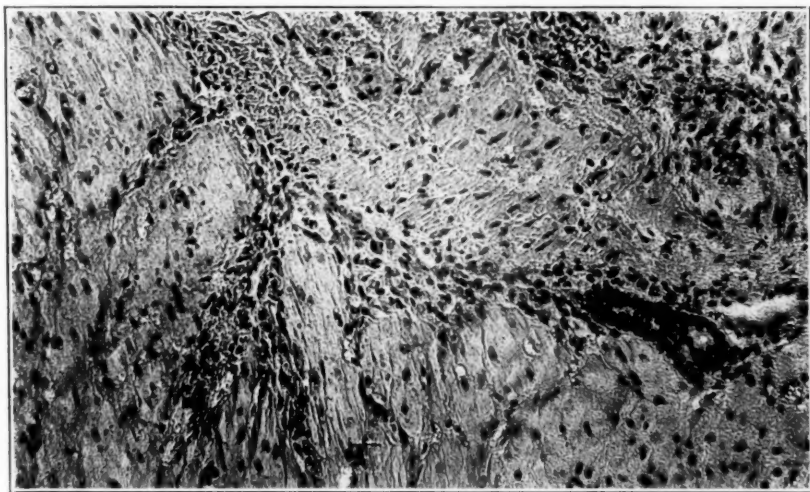
Fig. 8.—Guinea pig. No. 10. Seventeen hours after operation. Inner portion of the incision. Shows fibroblastic proliferation with gland inclusions and extension of fibroblasts between the muscle bundles.

be found. A considerable piece of placental tissue was found still attached immediately adjacent near the line of incision. There was marked polymorphonuclear leucocytic infiltration and also considerable necrosis in the muscle tissue adjacent to the line of incision. In the middle zone of the uterus there is practically complete necrosis along the line of incision. In the outer third this necrosis is even more marked and extends in some places at least 4 mm. from the line of incision. There is considerable less evidence of fibroblastic proliferation in this case than in the previous one.

It might be mentioned here that the extensive necrosis and the absence of fibroblastic proliferation may be explained by the fact that the patient was in very poor condition. As a result of this low vitality and with the additional suturing of the wall, the reaction was less and the necrosis more abundant. We feel in this case that the rather poor approximation of the inner surface of the wound would have led to a definite defect, resulting in a thin wall with endometrium entering the defect. Although this represents an abnormal amount of necrosis, due chiefly

to poor blood supply, we feel that considerable necrosis might occur similarly under normal conditions where too tight and too much suturing has been done. This case from the standpoint of good approximation is in marked contrast to the first case, in which the edges of the wound were so well applied.

CASE 3.—Specimen brought into laboratory by Dr. H. S. Crossen. Dr. Crossen was called in consultation on this case six days after cesarean section which had been performed by another physician. There was a question of whether or not peritonitis was developing. A supravaginal hysterectomy was performed six days after cesarean section. This case showed a marked infection of the wound in the uterine wall extending along the line of incision in many places, as well as through the uterine wall directly. A large number of streptococci were found in the inner half of the incision at all places in the wall and on the peritoneal surface. There was a marked accumulation of pus in the uterine cavity. There was unusually good approximation throughout the wound, and in many places, in spite of the bacterial infection, histologic findings were no different than in Case 1. In other

Fig. 9.—Guinea pig, No. 10. Seventeen hours after operation. Same field as Fig. 7, stained with Orcein-van Gieson stain. Entire tract lined with fibroblasts, stained bright red. The bright red areas of the picture are represented by the dark tract in the center of the picture and the darker ramifications to the side.

areas a purulent exudate was found throughout the wall containing numerous bacteria and causing extensive necrosis of the muscle. Some sections, however, show very little reaction in the tissue and the line of approximation is excellent. The fibrinous deposit was similar to that in Case 1, but there was less evidence of proliferation of fibroblasts. In these clean areas the fibrinous framework described by Couvelaire is well illustrated. In illustrating this case we will show such an area, which, with the absence of fibroblasts, does not differ essentially from the normal. The approximation of the wound along a line of considerable extent is almost perfect. No reaction is seen around the edges of the wound, although the entire fibrinous network of the inner half of the wound is literally loaded with streptococci.

The experimental work in this study consists of sixteen operations on the uterus of the guinea pig, near or at term. These experiments were carried out by Drs. Paddock and Corson. Pregnant animals of

good stock were selected at this time. Under ether anesthesia the abdomen was opened and the uterus exposed. Just before incision in the uterine wall a minim of pituitary preparation was injected directly into the lower portion of the uterine wall. The uterine wall of a pregnant guinea pig near term is exceedingly thin. The location of the fetuses can be seen and the larger uterine blood vessels are also quite evident. On account of the definite thinness of the uterine wall we were rather doubtful as to what results we could obtain. We were very definitely surprised in the subsequent examination of these incisions at the results. One or two incisions were made in the uterine wall after which easy removal of the fetus could be accomplished. The fetus and placenta were lifted out of the uterus. In most cases the bleeding was not profuse. Owing to the thinness of the uterine
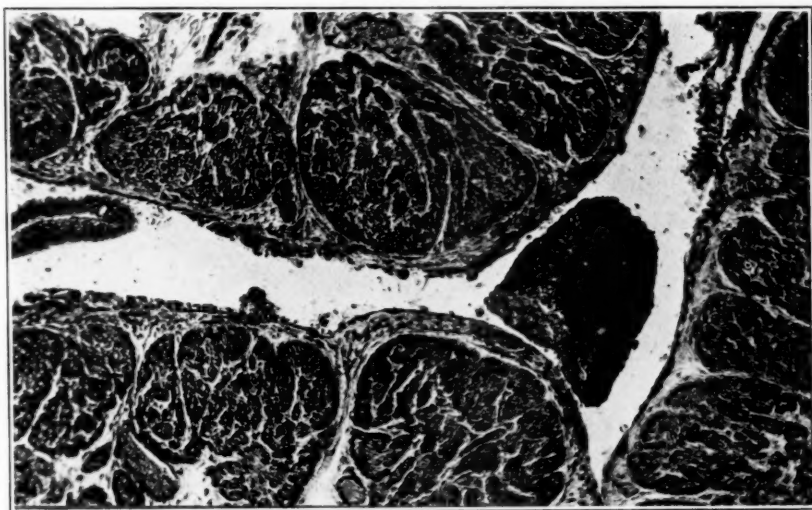
Fig. 10.—Guinea pig, No. 16. Five days after operation. Inner half of line of incision gaping, due to artefact. Endometrial tissue seen hanging to top of incision on left. Fibroblasts line the entire tract and invade definitely between the muscle bundles.

wall, suturing in layers was not possible. Using small needles and fine silk suturing material, the uterine incisions were closed. Continuous sutures were used, locking the sutures occasionally. The abdominal wound was sutured in layers.

The animals were sacrificed and were autopsied immediately after death. The time at which the material was thus obtained varied, so that we had specimens seventeen hours, one day, two days, two and one-half days, three and one-half days, three and three-fourths days, five days, twelve days, fourteen days, sixteen days, twenty-three days, twenty-eight days, and ten weeks after operation. Several of these cases had a considerable reaction in the endometrium and through the wall, due to a low grade infection, but we were able to study a sufficient

number of clean cases to clearly demonstrate just what takes place
in various stages of healing. We, therefore, limited our descriptions
to the cases which served this purpose best and which we felt the ac-
companying illustrations would clearly bring out. The following cases
were therefore selected:—Case 10, seventeen hours; Case 16, five days;
Case 14, twelve days; Case 7, twenty-three days, and Case 3, ten
weeks. The uteri were removed and fixed in formalin, with the ex-
ception of Case 16, which was fixed in Zenker's fluid. They were
stained with hematoxylin and eosin and by Orcein-van Gieson stain.
In going over these cases, as well as the material from the human
uteri, mitotic figures, both in muscle and connective tissue, were looked
for. Sections were of celloidin and from ten to twelve microns in
thickness, and, therefore, were not particularly well suited for such
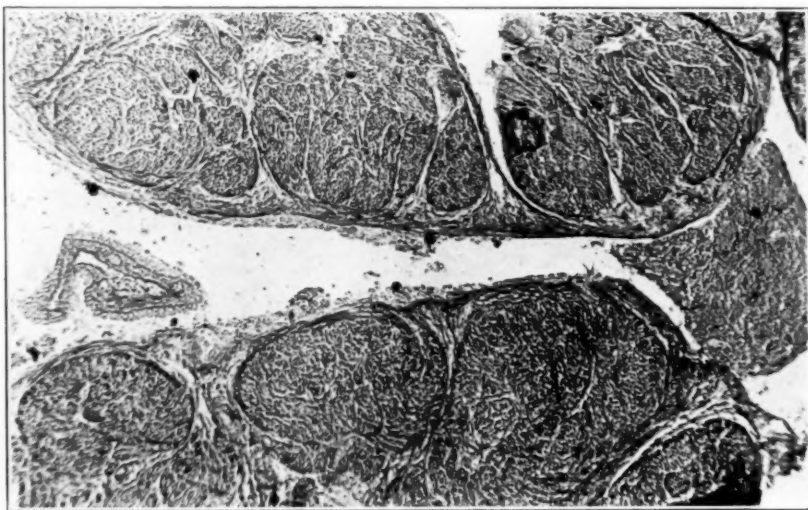
Fig. 11.—Guinea pig. No. 16.   Five days after operation.   Same field as Fig. 10.
Muscle bundles with Orcein-van Gieson stain definitely yellow.   Fibrous tissue along
tract, with its ramifications, stain bright red.   Differentiation between fibrous tissue
and muscle tissue well seen in this picture.

study. We were able to demonstrate very clearly in many of the
early cases mitotic figures in the connective tissue, but felt that we
could not demonstrate any such changes in the muscle cells. We are
preparing another series in which we will study particularly the de-
tailed cell changes, although we feel that our present study is very
convincing as regards the healing of the uterine wound in the guinea
pig at term. We might mention in this connection here again the
work of Loeb and Walsh and Loeb and Kuramitsu, which showed
that in normal involution in the guinea pig as well as incision in the
uterus of the nonpregnant animal, mitotic figures are rarely seen
after the eleventh day, and in the involuting uterus rarely after the
seventh day. As we were able to demonstrate rather abundant scar

tissue at a later period than this, we accordingly concluded that muscle regeneration played no considerable part in the final condition of the scar.

Our first case, Case 10, seventeen hours after operation, showed a wound in the uterine wall in very good approximation throughout its inner three-fifths and slightly gaping at the outer two-fifths, although this gaping was in part due to handling of the tissue after excision. A small amount of endometrium covers all but a small portion of the defect made by the incision. In the line of incision closely binding together the edges of the muscle are seen numerous fibroblasts. Along with this are seen very clearly new-formed capillaries. It is interesting to point out that the proliferation of fibrous tissue does not merely extend in a straight line, but there are numerous side-to-side ramifications between the bundles of the adjacent muscle. Also in the outer half of the uterus included in the line of incision are a half-dozen well-formed uterine glands. Along the edges of the
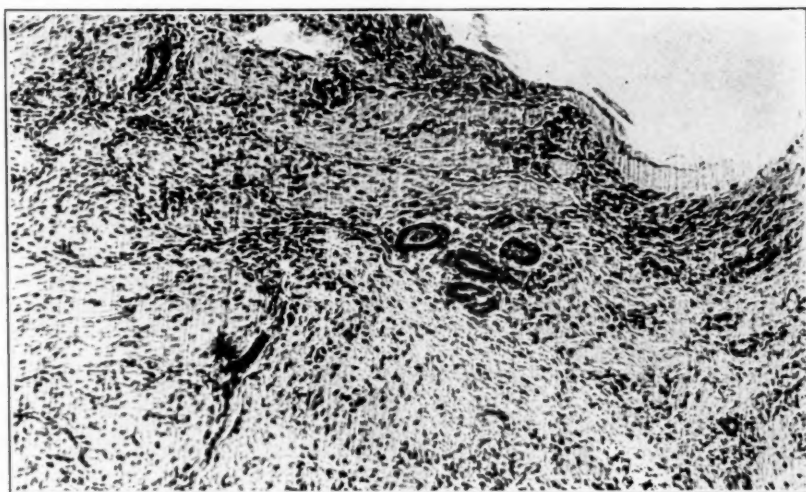
Fig. 12.—Guinea pig, No. 14. Twelve days after operation. Near center of picture is seen a group of included glands along the line of incision. Line of scar formation is chiefly below the level of the glands through entire extent. In the hematoxylin-eosin stain the scar tissue cannot be readily distinguished from the muscle tissue.

wound, which is separated, there is seen definite fibroblastic proliferation. Also on the peritoneal surface are implanted two small glands. The reaction about the silk sutures in the uterine wall is practically nil. A small amount of muscle necrosis is seen in the wound. This case, we feel, illustrates very clearly the marked proliferation of fibrous tissues between the cut edges of the muscle bundles, and therefore, represents early primary union which results definitely in the scar formation. When staining with Orcein-van Gieson stain the newly-formed connective tissue between the edges of the muscle bundles and the ramifications of this connective tissue between them stain clearly a bright red, leaving no doubt as to the nature of this tissue.

Case 16, five days after operation is the only case in which the embryos were not removed. Five days after incision the guinea pig was sacrificed and an area of tissue including the scar was removed from the uterus. The wall was about 3 mm. thick and approximation was even and complete throughout its extent. The wound

was about 1 cm. in length at this time. On studying the section stained with hematoxylin and eosin there were no infiltrating polymorphonuclear leucocytes present along or near the line of incision. It was an unusually clean incision. On handling the specimen the wound became slightly separated so that it had the appearance of a gaping wound. In this case this was definitely an artefact which took place during fixing and dehydrating the tissue. Along the entire tract of the incision can be seen a marked proliferation of fibrous tissue. This is not only evident along the line of incision but extends definitely within the muscle bundles. This is also seen abundantly in the serosa covering the outside of the uterus. Clear-cut mitotic figures were found in the fibrous tissue and in the gland structures in the endometrium. In the van Gieson stain the area in which the proliferating connective tissue cells are found to stain a bright red, extensions are clearly seen in between the muscle bundles. The endometrium is seen invading the inner edge of the tissue, not definitely attached, although we feel that this has

Fig. 13.—Guinea pig, No. 14. Twelve days after operation. (Same area as Fig. 12, but reversed.) Orcein-van Gieson stain. Glands here just below the center. Light stained areas represent the muscle tissue. Dark masses stain bright red and represent area of scar tissue formation.

also been in part dislodged through handling. We feel that this case illustrates beautifully the fibroblastic proliferation along the line of incision and between the bundles of adjacent muscle at five days after operation.

In Case 14, twelve days after operation, the uterine wall is about 2½ mm. thick through the line of incision. It is with difficulty that this is made out. There is a large amount of endometrial tissue transplanted near the outer edge of the incision and also at several points along the peritoneal surface of the uterus. One of our illustrations in connection with this case will bring out this feature clearly, and also the several glands deposited along the line of incision. The scar tissue along the line of incision can be made out with hematoxylin and eosin stain. There is a group of five glands near a silk suture, the glands being situated between the silk suture and the scar tissue. Staining this section with Orcein-van Gieson stain shows clearly that this area is entirely connective tissue which is being transformed into scar tissue, as this stain shows it to be bright red staining tissue throughout. Also the amount of connective tissue is markedly increased along the

entire tract of the former incision. As regards the finding of endometrial tissue along the line of incision in this case and in others, as well as transplants on the peritoneal surface, it may be mentioned that the frequency of this condition in the guinea pig is undoubtedly due to the rather thin muscle wall and the comparatively abundant endometrial tissue. In this connection it is interesting to mention that Burnam in discussing Sampson's paper on the life history of ovarian hematomas of endometrial type, stated that he was reporting for Dr. Cullen, three cases of adenomyoma of the abdominal incision, two of which occurred after ordinary cesarean section. One of these belonged to Dr. Stavely of Washington and the other to Dr. E. A. Codman of Boston. He stated that these two cases indicated that ordinary uterine mucosa implanted in the abdominal tissue can grow into a tumor exactly like adenomyoma. We have looked for the publication of these cases in the recent literature but apparently they have as yet not been described in detail.

Case 7, twenty-three days after operation, shows very beautifully the exuberant
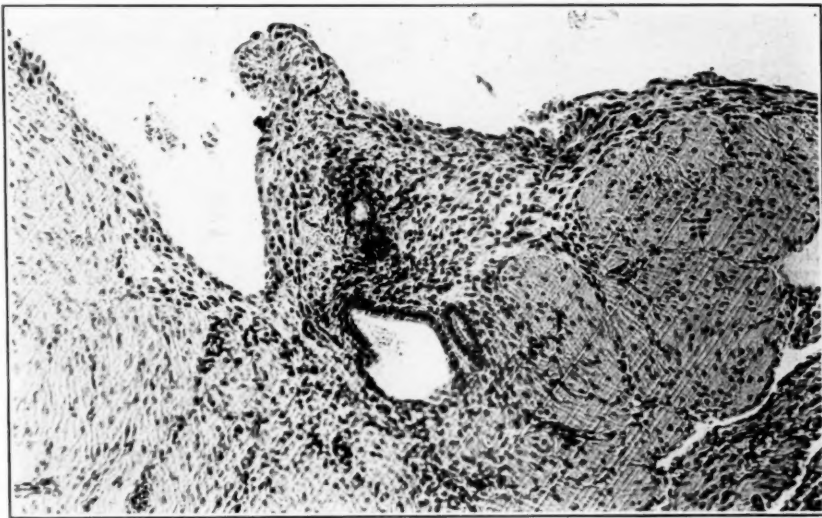
Fig. 14.—Guinea pig, No. 14. Twelve days after operation. Shows peritoneal surface of uterus with endometrial tissue implantation in this region.

development of the endometrium near and over the line of incision, just as the intestinal mucosa tends to overgrow at the line of incision in end-to-end anastomosis. It is evident in this case that the silk sutures had cut through considerably, and between them is found the line of incision which is made up of numerous good sized capillaries and abundant connective tissue. This area when stained with Orcein-van Gieson stain appears definitely bright red in color, bringing out the fibrous tissue character of this case.

In Case 3, ten weeks after operation, with the hematoxylin-eosin stain it is with difficulty that the line of former incision can be found. The scar has contracted in such a manner as to make this practically imperceptible. With the aid of Weigert-van Gieson stain we are able to demonstrate a marked increase in the serosal connective tissue just at the peritoneal surface. This is analogous to the external callus seen in intestinal wounds and also seen, almost without exception, in old cesarean wound in the human. There is slightly more connective tissue demonstrable with the van Gieson stain along former incision than elsewhere,

although this is so small in amount as to be insignificant. The silk sutures are enclosed by masses of invading connective tissue. There is no cellular reaction. In this case therefore, the scar is practically imperceptible, due to its shrinking and also its intimate relationship to the adjacent muscle bundles.

We have not, in this paper, entered into the discussion of the comparative merits of the lower segment or upper segment incisions. We agree, in the main, with Munro Kerr, as to the possible advantages of the low incision as regards obtaining a better scar, namely, (1) because it involves a less vascular area; (2) that on account of the thinness of the wall the edges can be brought together more readily; (3) the lower uterine segment is at comparative rest during the early puerperium; (4) the placenta is seldom encountered. Although these points speak for a much stronger scar, Gamble has already re-

Fig. 15.—Guinea pig. No. 3. Ten weeks after operation. Hematoxylin-eosin stain. Through line of former incision. Peritoneal surface at extreme left of picture. Line of incision cannot be seen in this picture.

ferred to Baisch's experience in 170 low incisions, with twenty-four repeated sections with three ruptures, which undoubtedly means that others will be reported.

It has not seemed reasonable to us that the low incision should be employed in such cases where delivery at the next pregnancy is to take place through the natural passages. We mention this because in ordinary rupture of the uterus, it invariably takes place in the lower uterine segment, due to its marked attenuation, and, therefore, the scar in this location should be more strained than in the higher incision, in spite of the contraction of the uterus during labor.

Since writing the above our attention has been called to an article by McIntyre on the healing of the uterine wound with mitosis in unstriated muscle. This article appeared in 1923, when McIntyre

demonstrated very definitely, mitotic figures in smooth muscle tissue in a uterus which was perforated in the process of dilating the cervix. Hysterectomy was performed seven days later and on histologic study definite mitotic figures were found in the smooth muscle.
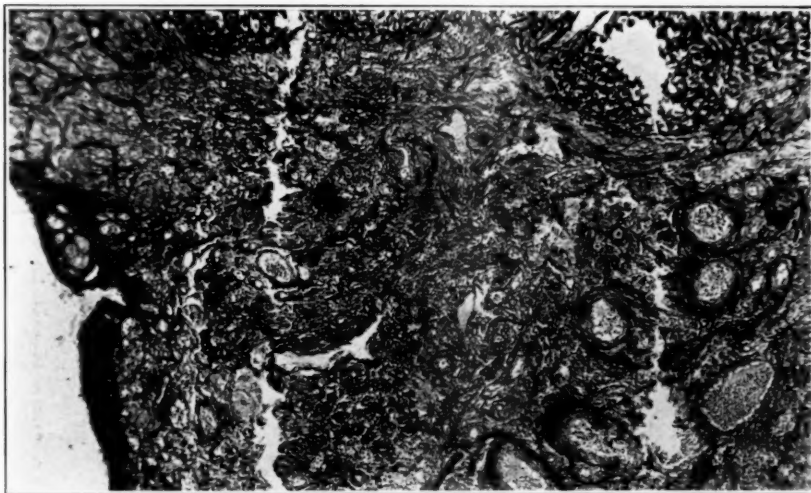
Fig. 16.—Guinea pig, No. 3.   Ten weeks after operation.   Orcein-van Gieson stain. Black area near peritoneal surface shows marked increase of fibrous tissue (area of external callus).   Slight increase in fibrous tissue just above center of picture.

CONCLUSIONS

Our conclusions, therefore, as regards the healing of the incision in the wall of the guinea pig uterus after abdominal hysterotomy are as follows:

The edges of the wound are held together by the early proliferation of fibroblasts along with capillaries, not only along the line of incision but also very definitely between the muscle bundles adjacent to this line.   A definite scar tissue develops and this can be clearly demonstrated in uteri from twelve to twenty-five days after the incision. In our case of twelve days after incision this was quite considerable. In the later stages, for example our case of ten weeks, the line of scar tissue formation with its ramifications is so contracted that on histologic examination it is difficult to make out, and it assumes very definitely the normal pattern of an uninjured uterine wall.   That muscle regeneration plays no conspicuous part in the final picture should be emphasized from the fact that the very laborious studies of Loeb and his coworkers show that mitotic figures are rarely found in the uterus of the guinea pigs seven days after delivery, and rarely after eleven days when the uterus is injured.   This means, in our opinion, that muscle regeneration, if it is to play a conspicuous part in the disappearance of these scars, must do it early.   It is quite evident from

our sections that this is not the case. Endometrial tissue is readily carried along the line of incision and readily implants itself on the peritoneal surface of the uterus. The frequency and extent to which this takes place is undoubtedly due to the marked abundance of endometrial tissue in these uteri. However, the actual peritoneal implantation of this tissue shows how readily and how easily this occurs. This, therefore, is further evidence of Sampson's implantation theory.

As regards the early healing of the human uterus after incision at cesarean section from the material which we were able to study, we would agree with Couvelaire that the deposition of a considerable band of fibrin between the cut muscle edges forms the basis from which healing takes place. That the line of defect in these cases where approximation has been good should be very small, is illustrated in our cases by the close approximation of the muscle edges. Fibroblastic proliferation which was definitely evident in our first case, which can be considered as practically normal healing, indicates that the early process is similar to that in the guinea pig. We felt that the absence of demonstrable scar over a considerable extent of a well-healed wall is due to the fact that the line of scar tissue is small to begin with, and secondly, because of its ramifications along the line of incision between the adjacent muscle bundles. Therefore, as the scar contracts it simulates more and more the normal pattern of the uterine wall and is not demonstrable on histologic examination.

We felt that this explanation of the shrinking of the scar as well as its many ramifications between the muscle bundles adds to its strength. We also think that sutures that are placed too tight, particularly the deepest row, will cause an increased amount of necrosis and will cut through more readily, leaving a gaping inner defect in the wound. On account of the low vitality of the tissue under such circumstances, filling of the defect by granulation tissue should take place only after a more prolonged period of time, and thus the much more rapidly proliferating endometrial tissue has an opportunity to enter and line the defect. It is obvious that the more extensive the cutting through of sutures is, the greater will be the amount of necrosis, and therefore, the greater the defect. Infection can further increase the necrosis and thereby allow the sutures to cut through more readily.

We feel that in this way many cases of thin scars which are lined with endometrial tissue are readily explained. The reaction around the catgut sutures in our two clean human specimens, with the amount of necrosis around them, suggests that this material is by no means the best. In contrast to this, and in the absence of infection, there was little or no reaction about the silk sutures in the guinea pig uterus.

We conclude further that the most important thing in the technic

of elective cesarean section is to obtain good wound approximation with a minimum amount of suturing, with as little tension on the sutures as possible. We feel that a single row of buried interrupted sutures and an outer running suture after the method used by Williams should give the best results.

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A STUDY OF THE WEIGHT AND DIMENSIONS OF THE HUMAN PLACENTA IN ITS RELATION TO THE WEIGHT OF THE NEWBORN INFANT

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NATURE is kind in building the human body and the various organs and tissues which are necessary to the maintenance of life and the reproduction of the human race.

There has been a liberal allowance for destructive influences and reparative processes without the loss or marked shortening of life

Fig. 1.—Photograph of cardboard placental outlines piled according to the newborn weight.

and fatal impairment of function which would otherwise result. This is true in adult life and also during the period of development. Organs may be of sufficient capacity, even though partially destroyed, for carrying the growing individual up to a point where the functional activity of the organ is exceeded by the increased demands of the larger and more mature organism.

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During human development one can easily recognize the two distinct but interwoven stages of antenatal and postnatal growth. We find during these periods, organs which essential during one phase, are nonessential to life in the other epoch.

We might mention as examples of these, two organs having in part analogous functions; one, the placenta, which is vital during the period of intrauterine existence and useless for postnatal life; and another, the lung which is nonessential during the embryonic and fetal life but of paramount importance if the existence of the newborn is to be established.

Defect or disease of the placenta, if of sufficient degree, may seriously affect the health and even the life of the fetus, but may not

Fig. 2.—Outlines piled according to placental weight.   Corresponds to Fig. 1.

affect the postnatal life of that individual. Defect or disease of the lungs has no effect on the intrauterine growth and existence of the fetus, but may have a fatal or serious result during postnatal life.

The placenta can be considered to be the most important fetal organ as it is absolutely essential to life. Any other fetal organ may be so impaired as to be inconsistent with continued postnatal life and yet carry on its function without apparent difficulty during intrauterine life. It is naturally very difficult to test the functional capacity of the placenta, and for this reason anatomic studies, undertaken to determine the normal relationship between the placenta and the newborn infant, assume considerable importance.

Various workers have approached their problems from different angles but this has never been exhaustively studied.

These reasons constitute the justification for the following contribution, the details of which have been carried out by Dr. H. Thelander. Both of us are greatly indebted to Prof. R. E. Scammon for many valuable suggestions and help.

Nature has not been less kind to us during our period of intrauterine life than in our subsequent existence. She has supplied, in an organ so essential to our development as the placenta, an abundance of reserve which may be utilized in case the placenta is damaged.

Fig. 3.—Outlines piled according to placental volume. Corresponds to Figs. 1 and 2.

The picture of a placenta is shown in Fig. 5, where over half of the placenta was destroyed by an extensive process of degeneration and yet the baby was born alive and survived. This infant was of the male sex and weighed 1,390 grams. This would indicate that at least one-half of the placenta may be destroyed without fatal issue to the offspring. This is not out of keeping with findings in bilateral organs such as the kidneys, where one may carry on the function of two and still have some reserve capacity.

It is, of course, obvious that any gross methods as applied to the placenta are more or less crude, but yet they give some information of definite value. In this work the weight, volume, surface area, specific gravity, and dimensions of the placenta have been taken in

their relationship to the birth weight of infants which may be considered to be average or normal offspring.

These methods do not take into account changes and defects in the placenta except as they may have affected its growth and development, but when taken for a large number of reasonably normal cases, the normal gross relationship or ratio between the placenta and infant must be closely approximated.

Before taking up the detailed findings in our cases, it would be well to give a rather brief statement of some of the findings of others who have worked along similar lines.

Holland (1922) reported a case in which at least two-thirds of the placental tissue was destroyed and the fetus survived until labor was almost complete. With

Fig. 4.—Outlines piled according to surface area of placenta. Corresponds to Figs. 1, 2 and 3.

a large amount of reserve, a considerable variation in weight of normal placentas is to be expected even though a constant relationship between the weight of the fetus and weight of the placenta exists. In fact some of the earlier workers denied any relationship between the two weights. Mackness (1889) reported most varying weights. He quoted from the Dresden Lying-in Hospital reports (1887), as follows: "An endeavor was made to show the relationship of the size and weight of the placenta to the child, but the data would not admit of more than the assertion that the uterus of elderly women from frequent menstruation, had large folds and elevations of the mucous membrane which favored the formation of a large placenta. The uteri of multiparae were also favorable to the foundation of a large placenta in consequence of the preceding involutions which offered less resistance to the formation of a large placenta." However, even earlier writers recog-

nized a relationship between the weight of the placenta and the weight of the newborn. Among them are Bustamente (1868) and Krüger (1877).

The later workers, as Smith (1891), Zentler (1891), Sfameni (1901), Laurent (1913), and Holland (1922) are agreed that the weights of the placentas are greater in the newborns of greater weight.

Fig. 5.—Massive infarction of placenta, with delivery of living infant.

Zentler (1891) found the average circumference to be 65 cm. and the dimensions were 16 to 19 cm. and 13½ to 16 cm.; the thickness varied from 1½ to 3 cm. in the thickest portion, and 4 to 6 mm. at the border. Sfameni (1901) gave two dimensions of the placenta in his report. LaVake (1924) reported 100 measurements of the circumference of the placenta. He thought there might be a relationship between the area of the placenta and the birth weight of the infant. Aside from the above very little work on the surface area has been reported.

In the present series the weight, volume, and surface area of the placenta were obtained and from this data, its thickness and specific gravity were determined. The birth weight of the newborn was taken and the various ratios were calculated.

This paper is the result of a study of 392 placentas taken seriatim at the Swedish and Minneapolis General Hospitals. A classification of the cases is to be found in Table I. In the series there were 217 placentas of male and 175 of female infants, while 240 were from multiparous and 150 from primiparous mothers; 370 of the placentas were placed in the normal full term group. There are very few placentas which are perfect, practically all of them showing some signs of degeneration. Our normal series, therefore, includes all the placentas that were not grossly abnormal, of full term babies. Those of definitely premature children were excluded, but the borderline cases were retained.

TABLE I

PLACENTAS FROM CASES ANALYZED

GESTATION	SEX	MULTIPARA	PRIMIPARA	TOTAL
Term	Male	134	66	200
	Female	96	74	170
Total		230	140	370
Premature	Male	7	8	15
	Female	2	1	3
Total		9	9	18
Multiple	Male	1	1	2
	Female	1	1	2
Total		2	2	4
	Male	142	75	217
Grand total	Female	99	76	175
		241	151	392

There were eighteen prematures in the series; fifteen of those placentas were of male and three of female children. Two twin placentas were also included in the study.

All infants were weighed on admittance to the nursery within a very short time after birth, and the birth weights were taken from the nursery charts.

The placentas were studied very soon after delivery to avoid errors due to drying. The membranes were stripped off at the margin and the cord was cut at the surface of the placenta. The volume was obtained by simple water displacement. After this the placenta was weighed accurately and its surface area was determined by tracing the periphery of the placenta on a sheet of paper and then measuring the area by the planimeter. In order to avoid inconsistencies, the studies were made in the same order each time and the same scales and vessels were used in all instances.

TABLE II

COMPARISON OF PLACENTAL AND NEWBORN AVERAGES

NORMAL CASES	SEX	NO. OF CASES	AVERAGE	MINIMUM	MAXIMUM
Newborn weight	M	200	3443 gm.	2312	5325
	F	170	3281 gm.	2090	4600
	M and F	370	3368 gm.		
Placenta					
Weight	M	200	479 gm.	255	830
	F	170	465 gm.	270	730
	M and F	370	473 gm.		
Volume	M	200	466 c.c.	240	810
	F	170	453 c.c.	260	700
	M and F	370	460 c.c.		
Surface area	M	200	251 sq. cm.	129	435
	F	170	244 sq. cm.	147	367
	M and F	370	248 sq. cm.		
Thickness	M	200	1.88 cm.	1.14	3.68
	F	170	1.86 cm.	1.06	2.68
	M and F	370	1.87 cm.		
Specific gravity	M	200	1.028	0.948	1.105
	F	170	1.028	0.924	1.280
	M and F	370	1.028		
Ratio*	M	200	7.38:1	4.41:1	11.35:1
	F	170	7.19:1	5.05:1	11.02:1
	M and F	370	7.27:1		
Multiple pregnancy (Term)					
Newborn weight	M		2450 gm.		
	F		2085 gm.		
	M and F		4535 gm.		
Placenta					
Weight			700 gm.		
Volume			675 c.c.		
Surface area			387 sq. cm.		
Thickness			1.74 cm.		
Sp. gravity			1.037		
Ratio*			6.48:1		
Premature					
Newborn wt.	M and F	18	1360 gm.		
Placenta					
Weight			297 gm.		
Volume			286 c.c.		
Surface area			165 sq. cm.		
Thickness			1.74 cm.	1.15	2.50
Sp. gravity			1.048	1.000	1.330
Ratio*			5.64:1	2.13:1	10.53:1
Multiple pregnancy (Premature)					
Newborn weight	M		960 gm.		
	F		840 gm.		
	M and F		1800		
Placenta					
Weight			345 gm.		
Volume			338 c.c.		
Surface area			195 sq. cm.		
Thickness			1.72 cm.		
Sp. gravity			1.020		
Ratio*			4.92:1		

*Ratio refers to the relation between weight of newborn and placenta.

From the above data, the average thickness of each placenta was obtained by dividing the volume by the surface area; the specific gravity was determined by dividing the weight by the volume; and the ratio of the weight of the baby to that of the placenta was calculated by dividing the former by the latter weight. The averages have been tabulated in Table II.

The average weight at birth of the 200 normal males was 3443 grams, and of the 170 normal females was 3281 grams. The figures are above the averages determined by Scammon and Doyle (1920), but these authors included all children having a birth weight over 2000 grams. The lowest birth weight of a term infant in our series was 2090 grams for females, and 2312 grams for males. The figures are also above the average determined by Ramsey and Alley for Minneapolis children, their figures being 3391 grams for male, 3276 grams for female.

The average weight of 200 placentas of male infants without membrane and cord was 479 grams, and that of 170 for females was 465 grams, making the average for the 370 normal cases 473 grams, with a variation from 255 to 830 grams in the male, and 270 to 730 grams in the female. These averages were much below those obtained by Mackness (1889). His average was 1 pound and 6.8 ounces or 646 + grams. He made no mention of the membranes and cord. These were probably included in the weights and account for the greater weight. The high figures for weight obtained by Krüger (1877) can probably be accounted for in the same way. His weights vary from 400 to 899 grams, with the majority between 500 and 700 grams. Bustamente (1868) and Zentler (1891) also have recorded high weights, though no averages were given for direct comparison. Sfameni (1901) and Holland (1922), on the other hand, had weights comparable to ours, but again no averages were given for the entire series and a direct comparison, therefore, could not be made.

The average volume for the 370 normal cases was 460 c.c., being 466 c.c. and 453 c.c. for the placentas of male and female infants respectively. The placental volumes varied from 240 c.c. to 810 c.c. for those of males, and 260 c.c. to 700 c.c. for those of female newborns. No other figures on volume were obtainable for comparison.

The specific gravity was obtained by dividing the weight of the placenta by the volume in each case. An occasional placenta had a specific gravity below one, and there were a few with a high specific gravity, but the average for the 370 normal cases was 1.028 + for the placentas of both male and female. The average for the eighteen placentas of prematures was 1.048. The specific gravity for fetuses collected from Seitz (1908), Schatz (1916), Dr. C. M. Jackson, and Dr. R. E. Scammon (unpublished) are as follows:

BODY LENGTH	SP. GR.	NO. OF CASES
10-20 cm.	1.041	4
20-30 cm.	1.044	16
30-40 cm.	1.049	12
40-50 cm.	1.049	13
50-over	1.050	8

The surface areas varied from 129 to 435 sq. cm. for placentas of male, and 147 to 367 sq. cm. for those of female infants, the averages being 251 sq. cm. and 244 sq. cm. respectively. Sfameni (1901) gave two dimensions of the placentas, but no figures, either calculated or estimated for the surface area. The only other figures obtainable for comparison were those by Zentler (1891). He gave an average circumference as 65 cm. and dimensions 16 to 19 by 13½ to 16 cm.

LaVake (1924) determined the surface area of the placenta in 100 cases from the circumference measured by a string placed around the margin of the placentas. He gives no averages but states that he obtained a quotient by dividing the weight of the newborn by the surface area expressed in sq. cm. This quotient was 12.5 and he deemed it fairly accurate.

In our series the average weight of male infants divided by the average surface area of their placentas in sq. cm. gave a quotient of 13.7 and that obtained in a similar manner for the female infants was 13.4. These figures are higher than those given by LaVake.

We feel that the method used by us to determine the surface area of the placenta was the more accurate, but this difference in the results obtained may be accounted for by the different methods used.

A composite picture of the placentas was made by drawing the outlines of one placenta upon the other on a sheet of paper. This gave a heavier line where most of the margins came. When complete, it presented an oval whose greatest dimensions varied from 15.4 to 22.7 cm., and the least dimensions were 12.8 to 19.7 cm., making the average 19 and 16.2 cm. A number of lines ran outside and inside these limits, but they were few and scattered and were not included in the measurements.

The outlines were also cut out of heavy blotting paper and placed one on top of the other in proper order. A photograph of one of the piles is shown in Fig. 1.

The forms were cut and numbered consecutively according to surface area from greatest to least. These placental outlines were piled according to different data in order from highest to lowest, every tenth placenta according to size being shown in brown paper. The data used in making these models were the birth weights of the newborns. This enables one to visualize the relationship between the surface area and dimensions of the placentas and the weight of the newborn infants. In Fig. 1, we see the placentas of the heaviest infants at the bottom and those of the lightest at the top. The pile is

irregularly columnar in shape and does not show a truncated cone, such as one might expect if the correlation were very close.

The top view gives the same impression except for the few placentas of premature infants lying on the top. In this view the dominant oval shape of the placentas may be readily seen. The irregular distribution of the brown sections shows the varying relationships.

In making other models (Fig. 2) the same paper outlines were used. They were stacked according to the placental weights; the heaviest being at the bottom, and the lightest at the top. One receives a definite impression of the relationship of the weight to the size of the placentas. The column is more symmetrical and tends to be more conical in shape than that in Fig. 1. One might conclude that there is a more definite relationship between the weight and size of the placenta than between the birth weight of the infant and the size of the placenta.

In Fig. 3 we have the placentas piled according to their respective volumes. We see here more symmetrical and conical models with more even distribution of the brown outlines. This indicates a closer relationship between the surface area and volume of the placentas than is shown in the preceding models.

In Fig. 4 the relation of the surface area to placental dimensions is shown and one sees a fairly symmetrical truncated cone with an even distribution of the brown segments.

The average thickness of the placenta was obtained by dividing the placental volume by its surface area. No attempt was made to estimate the thickness directly. Some placentas were of fairly uniform thickness, while others varied considerably. Our averages were 1.88 cm. for those of males, and 1.86 cm. for those of females, or 1.87 cm. for the 370 normal cases, varying from 1.14 cm. to 3.68 cm. for males and 1.06 cm. to 2.68 cm. for females. The average for the prematures was 1.74 cm., which is relatively high, the average weight and volume being 297 grams and 286 c.c. respectively. As will be seen later, many of the premature placentas are thick. Zentler's (1891) figures on thickness gave $1\frac{1}{2}$ to 3 cm. at the thickest portion and 4 to 6 mm. at the margin of the placenta.

The average ratio of the weight of the baby to the weight of the placenta was 7.38:1 for males and 7.19:1 for females, and 7.27:1 for the 370 normal cases. It varied between 4.41:1 and 11.35:1 for males and 5.05:1 and 11.02:1 for females. For prematures it was 5.64:1, varying from 2.13:1 to 10.53:1. The two twin placentas gave ratios of 6.48:1 and 4.92:1 for the multiparous and primiparous mothers respectively.

Holland's (1922) figures were slightly higher than ours. He gave the weight ratio as 7.6:1 in a series of ninety-four normal fetuses.

Sfameni's (1901) figures were also higher, being 7.78:1. Laurent's (1913) figures gave the ratio as 5:1 for small children and 7:1 for large infants. Smith's (1891) figures were as follows:

1/3 during thirty-third and thirty-fourth weeks of gestation.
1/4 during thirty-fifth and thirty-seventh weeks of gestation.
1/5 during thirty-ninth week of gestation.
2/9 at end of thirty-ninth week of gestation.

The correlation was determined to express the relationship more accurately.

In order to obtain the indices of correlation, the standard deviation was determined. This was done in the usual way, by squaring the deviations, adding the results, dividing by the number of cases and extracting the square root of the figure obtained. The results were as follows for the standard deviations:

	MALE	FEMALE
Newborn weight	537	498.13
Placenta weight	103	94.83
Placenta volume	104.1	93.6
Placenta surface area	53.3	44.23

The indices of correlation were determined according to the formula $r = \dfrac{\leqslant (xy)}{I (n_1\ n_2)}$ with the following results:

Correlation between weight of newborn and weight of placenta	+ 0.636	+ 0.632
Correlation between newborn weight and volume of placenta	+ 0.619	+ 0.700
Correlation between newborn weight and surface area of placenta	+ 0.491	+ 0.525
Correlation between weight of placenta and surface area of placenta	+ 0.702	+ 0.674

These figures show a high correlation between the weight of the newborn and the weight and volume of the placenta, and a definite yet lower correlation between the weight of the newborn and the surface area of the placenta. The same relation is shown graphically by the curves in Tables III, IV, and V. In these tables, the curve shows the average and the numbers the distribution of the cases around the average. Our findings, therefore, agree with those authors who have found a definite relationship between the weight of the newborn and the weight of the placenta. The correlation between the weight of the placenta and the surface area is also high.

It is evident that the development of the fetus does not depend solely on the weight or size of the placenta. Other very important factors, such as the membranes, the length and insertion of the cord, the amniotic fluid, must be considered. Tables were, therefore, made of the very thin and very thick placentas, of those having low and high specific gravities, of those with low and high ratios, and of the placentas with marginal insertion of the cord.

TABLE III

COMPARATIVE WEIGHT OF PLACENTA AND NEWBORN

Legend: underlined number = Male (♂); lower number = Female (♀). Abscissae = Placenta volume in grams; Ordinatae = Newborn weight in grams.

Newborn (g)	Sex	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000	4250	4500	4750	5000	Total
800–850	♂																	2			2
	♀																				—
750–800	♂																1		1		2
	♀																				—
700–750	♂																1	1	1		3
	♀													1		1	1				3
650–700	♂								1					1	1	1	1				5
	♀												1	1		3					5
600–650	♂									1		1		2	2	3	2		1		12
	♀											1	2	1	2	2	1				9
550–600	♂									1			2	2	5	8	2	1	1		22
	♀												3	3	1	2	2	1			12
500–550	♂			1						1	2	1	4	9	5	6	4				33
	♀										5	5	8	5	6	2					31
450–500	♂								1		1	5	8	8	8	10	1	1			43
	♀								2	1		5	12	4	2	1					27
400–450	♂										1	5	11	7	7	3					34
	♀								1	1	1	7	10	8	1	1					30
350–400	♂			1							5	6	7	6	2	1		1			29
	♀								2	5	3	11	6	4	2	2					35
300–350	♂			2		1			2		5	3	3	2							18
	♀			1					1		5	5	2	1							15
250–300	♂			1	1	1			1	1	1	2									8
	♀			1					1	1	2										5
200–250	♂			1	1																2
	♀			1																	1
150–200	♂																				—
	♀																				—
100–150	♂	1			1																2
	♀																				—
Total	♂	1		6	3	2			3	5	15	21	38	32	32	31	11	8	4	2	215
	♀			2					4	10	11	30	29	39	18	14	11	4	1		173
	Both	1		8	3	2			7	15	26	51	67	71	50	45	22	12	5	2	388

Combined row totals (right margin): 2, 2, 6, 10, 21, 34, 64, 70, 64, 64, 33, 13, 3, 2 — grand total 388.

—................Male
Abscissae........Placenta volume in grams
Ordinati........Newborn weight in grams

TABLE IV
COMPARATIVE VOLUME OF PLACENTA AND WEIGHT OF NEWBORN

Each cell shows male (numerator, underlined) over female (denominator). Ordinate = newborn weight in grams; abscissa = placenta volume in grams.

Weight	500	1250	1500	1750	2250	2500	2750	3000	3250	3500	3750	4000	4250	4500	4750	5000	Total	
850													1				1	1
800												1	1			1	3	3
750												1	1	1			3	3
700					1			1/1	1/1		1/3	/1					3/6	9
650						1		/2	1/1	/2	1/2	/1		1		1	4/8	12
600							/1	1/1	2/1	4/1	5	3/3	2/1				17/8	25
550						/2	2	/3	4/3	5/8	6/8	9/4	4/1	1/1	1		32/30	62
500		1			1/1	/1	1/1	3/2	7/5	9/9	10/2	10/3	3/2	1			46/26	72
450							1/1	/1	7/4	7/8	6/13	6/3	3/1				30/30	60
400		1	1	2			1/2	3/5	5/5	13/11	10/10	5/4	4/2	1			46/39	85
350		1					1/3	7/4	5/7	4/1	2/2	/1					20/19	39
300		1/2	1				1/1	1/1	/2	2/1							6/7	13
250		1	1						/1	1							3	3
150	1																1	1
Total (male / female)	1/–	5/2	3	2	3/4	3/12	15/11	21/30	38/29	32/40	35/19	31/11	11/11	8/4	4	2	215/173	388
Total	1	7	3	2	7	15	26	51	67	72	54	42	22	12	4	2		388

—................Male
Abscissae......Placenta volume in grams
Ordinati........Newborn weight in grams

TABLE V

COMPARATIVE SURFACE AREA OF PLACENTA AND WEIGHT OF NEWBORN

Note: in each cell the figure before the slash is the male count (underlined in the original); the figure after the slash is the female count. Blank = none.

Area ↓ \ Wt →	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000	4250	4500	4750	5000	Total
≥425																	1/			1/ → 1
425–400																				0
400–375														2/				1/		3/ → 3
375–350									/1		1/1				1/	1/				3/2 → 5
350–325									3/	3/1	2/		1/2		1/					10/3 → 13
325–300									1/	2/	2/1	2/2	3/3	1/5	/1	1/	1/			13/12 → 25
300–275									2/1	3/2	3/8	4/5	6/4	3/1	2/1		1/			24/22 → 46
275–250								1/	1/5	6/6	4/7	9/4	4/3	4/3	1/1					30/29 → 59
250–225							3/3	2/4	5/9	10/9	11/9	10/3	7/1	2/2	1/	1/	1/			53/40 → 93
225–200				1/			2/2	1/4	6/2	5/5	9/9	6/11	6/3	6/1	1/					43/37 → 80
200–175				2/			1/	1/1	4/3	4/5	5/2	2/2	1/1	/1						20/15 → 35
175–150				1/	1/			/2	1/2	2/4	1/1	/1								6/10 → 16
150–125				1/2	1/	1/			1/	1/1	1/									6/3 → 9
125–100					1/															1/ → 1
100–75					1/															1/ → 1
75–50	1/																			1/ → 1
Total (M)	1		5	3	2		3	5	15	21	38	31	35	30	11	6	5	3	1	215
Total (F)			2				4	10	11	30	29	40	18	14	11	4				173
Total	1		7	3	2		7	15	26	51	67	71	53	44	22	10	5	3	1	388

—...............Male
Abscissae........Placenta surface area in sq. cm.
Ordinati........Newborn weight in grams

Table VI is an analysis of the placentas with a thickness of less than 1½ cm. The deviations from the normal were given instead of the actual figures for the weight, volume, and surface area, because the table then tells at a glance whether the figures are above or below average. The gravidity of the mother was put down chiefly because considerable has been written on the effect of repeated pregnancies on the size of the placenta.

A thin placenta may show one of two things, either a proportionately small placenta or a disproportion between the volume and the surface area. In studying Table VI, it will be seen that only thirteen of these newborns were above the average, the other thirty-seven being below the average weight. A very thin placenta, therefore, usually means a small baby. Of the placentas, forty-six had a volume below the average, and only four were above, while twenty-two had a surface area equal to, or above that average, and twenty-six were below. Of the four with volumes above the average, two belong to newborns above and two to newborns slightly below the average weight. In two of these, the placentas were apparently normal, except for the disproportion between the volume and surface area. One of the other two had a very short cord and low specific gravity; and the other a long cord and low specific gravity, without other evidence of abnormality.

Nine of the fifty placentas were of premature infants and below the average in size. Of these nine, one was from a case of toxemia of pregnancy, two were placentae praeviae. In the other six the cause of prematurity was not determined.

Fifteen others were placed in the group of proportionately small placenta. Of these, seven showed no evidence of pathology, two showed slight abnormality of cord, one had a marginal cord, one had an irregular shape, three showed slight degeneration, and one was an ablatio placentae.

Twenty-six were placed in the group showing a disproportion between the volume and the surface area. In eleven of these, no pathology was found to account for the disproportion; three had cords inserted at the margin, and of these, one gave a history of dilatation and curettage, which suggests some pathology of the uterine mucosa. Three others gave a history of persistent leucorrhea, which also suggests some genital disease that might account for a large placental surface area. Of the remaining, three showed slight abnormality of the cord, and six showed slight degeneration in the placentas.

There were four of the fifty, or 8 per cent, that had marginal insertion of the cord. The percentage for the entire number was 6. A normally implanted placenta in a normal uterus should increase uniformly in all directions. This would produce a round or slightly oval

TABLE VI

Placentas Tabulated According to Placental Thickness

(Thinner Placentas)

Male

THICKNESS	DEVIATIONS FROM NORMAL			GRAVIDA		REMARKS
	NEWBORN WEIGHT	PLACENTA VOLUME	PLACENTA SURFACE AREA	P	M	
cm.	gm.	gm.	sq. cm.			
1.14	- 165	- 65	-100		3	Long cord (93 cm.), centrally attached; low specific gravity
1.15	- 840	- 105	- 24		2	Premature high specific gravity
1.15	-1125	- 185	- 8	1		Premature; toxemia of pregnancy
1.17	-2392	- 235	- 55		5	Premature; history of abortions, cause undetermined
1.24	- 360	- 108	+ 37		3	Marginal insertion of cord; large infarct near insertion
1.31	- 5	- 65	+ 45	1		Large surface area
1.32	- 20	- 84	- 39			Irregular in shape
1.34	+ 350	- 35	+ 70	1	4	Persistent vaginal discharge
1.34	- 240	- 15	+ 63	1		Large surface area
1.35	+ 30	- 25	+ 44		3	Large surface area; persistent vaginal discharge
1.37	- 270	- 90	+ 23	1		Marginal insertion of cord; persistent vaginal discharge
1.38	- 555	- 224	- 76		4	Few small white infarcts; marginal insertion of cord; vessels small
1.39	+ 140	- 128	- 7		4	Marginal infarcts; low specific gravity

TABLE VI—CONT'D

THICKNESS	DEVIATIONS FROM NORMAL			GRAVIDA		REMARKS
	NEWBORN WEIGHT	PLACENTA VOLUME	PLACENTA SURFACE AREA	P	M	
cm.	gm.	gm.	sq. cm.			
1.41	− 240	− 90	+ 15		3	High specific gravity; persistent vaginal discharge
1.41	− 240	− 90	+ 16	1		Vomiting first half of pregnancy; high specific gravity
1.41	+ 10	− 65	+ 33		4	Premature one month; cause not determined
1.43	−1392	− 165	− 41		2	Long cord (94 cm.), eccentric
1.43	+ 85	− 65	− 23		2	Premature; cause not determined
1.44	−2092	− 300	−136		2	Premature one month; cause not determined
1.44	−1382	− 156	− 36	1		Fibrous
1.44	− 360	− 118	− 10	1		Very short cord (25 cm.), eccentric; low specific gravity
1.45	− 60	+ 35	+ 97		3	Marginata; large infarct maternal surface
1.45	− 300	− 171	− 48		2	Large surface area
1.47	+ 363	− 65	+ 21		2	Large surface area
1.47	− 305	+ 85	+121	1		Relatively large surface area
1.48	− 160	− 85	± 0	1		Low specific gravity
1.48	− 440	− 115	− 13			Two white infarcts maternal surface, 1½ cm.
1.49	− 665	− 99	− 5	1	8	Large surface area
1.49	− 255	− 98	− 5	1		
1.49	+ 90	− 75	+ 11			
Average	0	0	1	12	18	
Above av.	7	2	13			
Below av.	23	28	16			

TABLE VI—CONT'D

Female

THICKNESS	DEVIATIONS FROM NORMAL			GRAVIDA		REMARKS
	NEWBORN WEIGHT	PLACENTA VOLUME	PLACENTA SURFACE AREA	P	M	
cm.	gm.	gm.	sq. cm.			
1.06	-1061	-103	+86	1		Premature; placenta praevia
1.12	-786	-178	+2		2	
1.22	-381	-103	-42		2	Placenta ablatio; cause unknown
1.36	-181	-78	+53		2	Marginal insertion of cord
1.36	+720	+47	+123		3	
1.37	-521	-128	-7			
1.37	-231	-115	±0	1		
1.39	+205	+39	+109	1		Cord 80 cm.; high specific gravity
1.41	-1166	-135	-19	1		Premature one month; irregular shape
1.41	+525	-43	+45		2	
1.41	-341	-110	-2		2	Short thick cord; kidney shaped
1.42	-80	-67	+27		2	Marginata; fibrocalcareous degeneration
1.46	-1191	-28	+46		10	Premature; placenta praevia
1.46	-50	-169	-51		3	
1.47	-366	-93	+1	1		Irregular shape; marginal infarcts
1.47	+320	-96	-1		4	Few white infarcts
1.48	-715	-111	-13	1		Marginal infarcts
1.49	+195	-87	+1		3	Small
1.49	-381	-103	-10		3	
1.49	+185	-93	-3		2	Fibrocalcareous degeneration
Average	0	0	1	7	13	
Above av.	6	2	9			
Below av.	14	18	10			
Male and Female						
Average	0	0	2	19	31	
Above av.	13	4	22			
Below av.	37	46	26			

placenta with a centrally attached cord. It is, therefore, probable that a marginal insertion of the cord means some abnormal condition which prevents the proper development of the placenta. On the other hand, a perfect placenta, with a centrally attached cord of normal length, and a normal specific gravity, should theoretically be able to take care of the development of a fetus which is above the average for the size of the placenta.

A thick placenta may be one of two types, either an unusually large placenta with corresponding increase in thickness, or a small one having a disproportion between the volume and the surface area. All placentas with a thickness above 2.20 cm. were tabulated (Table VII). There were fifty-four in the group. Of these, twenty-one were placentas of large size. There were eleven with both the newborn weight and the placentas above the average, but the surface areas of the placentas were relatively small. Among eleven of these, three showed marginal degeneration, such as circumvallata or marginata; two had marginal insertion of the cord; three showed slight degeneration; and three were apparently normal. The remaining placentas were small, with a very small surface area. Nine of this group showed marginal degeneration in the form of marginata or circumvallata, making a total of twelve placentas, or 22 per cent, with this type of degeneration. The percentage for the entire series was 13. Twelve others showed slight degeneration, and one was a syphilitic placenta.

From a study and comparison of the two tables it appears that the placenta can hypertrophy in two ways, either by increasing in surface area or by increasing in thickness. Some pathologic changes of the endometrium probably tend to produce a placenta with a large surface area, while pathology in the placenta itself often begins at the margin and may limit further growth in one or more directions, and any hypertrophy that takes place must, therefore, be in thickness.

Table VIII gives an analysis of the placentas with low specific gravity. Three-fifths of the babies were above average weight. The weight, volume, surface area, and height of the placentas, and the ratio of the weight of the baby to the weight of the placenta, averaged practically normal. However, fifteen, 43 per cent, of the thirty-five had central attachment of the cord, while the average for the entire series was 16 per cent. Eighteen of the thirty-five were apparently normal, and eleven showed only slight degeneration, all of which indicates that these placentas were very nearly normal.

Table IX shows an analysis of the placentas having a specific gravity above 1.060. There were twenty in this group. Eleven of the twenty children were below average, and nine equal to, or above the average. The placentas were a little below the average, but not markedly so. In this series there were three premature infants, one

TABLE VII

PLACENTAS TABULATED ACCORDING TO PLACENTAL THICKNESS

(THICKER PLACENTAS)

Male

THICKNESS	DEVIATIONS FROM NORMAL			GRAVIDA		REMARKS
	NEWBORN WEIGHT	PLACENTA VOLUME	PLACENTA SURFACE AREA	P	M	
cm.	gm.	gm.	sq. cm.			
2.21	− 90	+114	+ 11	1		Few infarcts both surfaces
2.21	− 130	+114	+ 12	1		Marginata
2.22	+1495	+258	+ 75		3	Fibrocalcareous degeneration; postmature
2.22	− 100	+ 27	− 29		2	Fibrous, and infarcts
2.23	+1285	+ 85	− 3		2	Numerous infarcts fetal surface; postmature
2.23	+ 665	+114	+ 9		2	Large; postmature
2.23	− 225	− 31	− 55		4	Circumvallata
2.23	+ 225	+ 75	− 8		2	Few white infarcts fetal surface
2.23	+ 380	+ 85	− 4		3	Fibrocalcareous degeneration; postmature
2.24	−1128	+ 70	− 12		3	Mother positive Wassermann reaction; cord knotted
2.24	+ 355	+ 27	− 31		7	Numerous white infarcts; fibrous
2.25	− 330	− 94	− 85		5	Circumvallata
2.25	− 190	+ 56	− 19	1		Rather large cord; fibrous
2.26	+ 660	+114	+ 6		2	Fibrocalcareous degeneration; postmature
2.27	+ 925	+114	+ 5		6	Fibrous; white infarcts; postmature
2.27	+ 950	+185	+ 36		2	Fibrous; postmature
2.28	+ 680	+ 46	− 26	1		White infarcts fetal surface
2.28	+1245	+327	+ 96		6	Fibrocalcareous degeneration; postmature

TABLE VII—Cont'd

THICKNESS	DEVIATIONS FROM NORMAL			GRAVIDA		REMARKS
	NEWBORN WEIGHT	PLACENTA VOLUME	PLACENTA SURFACE AREA	P	M	
cm.	gm.	gm.	sq. cm.			
2.29	+ 790	+114	+ 4		8	Fibrocalcareous degeneration; postmature
2.29	- 330	+ 17	- 40		8	Few marginal infarcts; signs of early toxemia
2.36	+ 600	+205	+ 34		6	Fibrous; postmature
2.37	-1015	+ 46	- 35		3	Dead fetus; marginata; large degenerate areas
2.38	-2363	+ 17	- 48	1		Marginata; marginal insertion of cord; toxemia
2.40	+ 15	+ 56	- 33			
2.42	- 300	+ 75	- 27	1	2	Fibrous; marginal insertion of cord
2.44	+1015	+249	+ 52		6	Degenerated; fibrous; postmature
2.45	- 115	+ 37	- 45		4	Fibrous
2.47	- 390	+ 37	- 47	1		Infarcts fetal surface; large cord
2.50	-2282	- 79	- 96	1		Premature; placenta praevia
2.52	+1225	+345	+ 7		2	Fibrocalcareous degeneration; postmature
2.56	+1540	+162	- 5	1		Fibrocalcareous degeneration; postmature
2.61	+ 345	+ 75	- 43	1	3	Marginal insertion of cord; white infarcts
2.72	- 725	+142	- 27	1		White infarcts fetal surface; early toxemia
2.73	+ 120	+115	- 38	1		
2.82	-1020	+210	- 11		5	Dead fetus; circumvallata
2.87	- 665	- 69	- 12	1		Circumvallata
3.68	+ 980	+ 10	-121		2	Persistent vaginal discharge
				12	25	
Above av.	20	33	12			
Below av.	17	4	25			

TABLE VII—CONT'D

Female

THICKNESS	DEVIATIONS FROM NORMAL			GRAVIDA		REMARKS
	NEWBORN WEIGHT	PLACENTA VOLUME	PLACENTA SURFACE AREA	P	M	
cm.	gm.	gm.	sq. cm.			
2.23	- 36	+ 19	- 33		6	Marginal infarcts
2.23	+ 505	+ 77	- 7		10	Many infarcts, both sides
2.23	- 381	-125	- 97	1		Marginata, and infarcts
2.28	- 86	- 67	- 75		3	Several infarcts fetal surface
2.31	- 321	+126	+ 6	1		Fibrocalcareous degeneration
2.35	+ 125	+202	+ 35		4	Marginata with numerous infarcts
2.35	+ 865	+247	+ 54		2	Large; postmature
2.36	+ 205	+ 77	- 20		4	Marginal insertion of cord; white infarcts
2.36	+ 270	+ 29	- 40		2	Circumvallata
2.44	+ 175	+ 39	- 43		3	Circumvallata
2.44	+ 770	+174	+ 13	1		Fibrocalcareous degeneration; postmature
2.45	+ 446	- 29	+ 71		3	White infarcts fetal surface
2.47	+ 805	+203	+ 21		3	Marginata; postmature
2.48	+ 120	+ 78	- 30	1		
2.52	+ 955	+213	+ 20		2	Fibrocalcareous degeneration; postmature
2.59	+1070	+232	+ 20		6	Fibrocalcareous degeneration; postmature
2.68	+ 95	+ 29	- 86		3	Marginata; central cord
				4	13	
Above av.	12	14	7			
Below av.	5	3	10			
Male and Female				16	38	
Above av.	32	47	19			
Below av.	22	7	35			

TABLE VIII

PLACENTAS OF LOW SPECIFIC GRAVITY

Male

SPECIFIC GRAVITY	NEWBORN WEIGHT gm.	PLACENTA VOLUME gm.	PLACENTA SURFACE AREA sq. cm.	PLACENTA THICKNESS cm.	RATIO*	CORD INSERTION	GRAVIDA P	GRAVIDA M	REMARKS
.948	− 875	−175	− 86	1.77	9.32:1	Central		3	Negative; father history of lues
.976	+ 70	− 45	− 2	1.69	8.80:1	Eccentric		6	Few infarcts
.986	− 300	−171	− 48	1.45	10.82:1	Eccentric		2	Marginata
.994	+1015	+249	+ 52	2.44	6.27:1	Central		6	Fibrocalcareous
.997	− 665	− 99	− 5	1.49	7.60:1	Central		8	
.998	+ 435	+ 56	+ 11	2.18	7.45:1	Eccentric		7	Fibrocalcareous
1.000	− 165	− 65	−100	1.14	8.18:1	Central		3	
1.000	+ 325	+ 65	+ 42	1.81	7.10:1	Eccentric	1	2	
1.000	− 215	− 60	− 11	1.55	7.96:1	Eccentric			
1.000	− 230	−100	− 54	1.86	8.79:1	Eccentric		2	Few infarcts
1.000	− 880	− 70	− 37	1.85	6.48:1	Marginal		3	Marginata
1.000	+ 560	+135	+139	1.53	6.66:1	Eccentric	1		
1.001	+ 545	+114	+ 76	1.78	6.87:1	Eccentric		7	
1.004	+ 520	− 7	+ 40	1.58	8.60:1	Eccentric		3	
1.004	+1540	+162	− 5	2.56	7.90:1	Eccentric; very large vessels	1	4	Fibrocalcareous
1.004	+ 655	+ 35	− 6	2.05	8.15:1	Eccentric 80	3	13	
Above av.	9	7	6	4	11	Central 4			Marginata 2
Below av.	7	9	10	12	5	Eccentric 11			Slight degeneration 5
						Marginal 1			Negative 9

TABLE VIII—CONT'D

Female

SPECIFIC GRAVITY	NEWBORN WEIGHT	PLACENTA VOLUME	PLACENTA SURFACE AREA	PLACENTA THICKNESS	RATIO*	CORD INSERTION	GRAVIDA		REMARKS
	gm.	gm.	sq. cm.	cm.			P	M	
.924	− 321	+126	+ 6	2.31	5.53:1	Lateral	1		Fibrocalcareous
.936	−2131	−199	−103	1.83	4.89:1	Central	1		Circumvallata
.988	+ 775	+164	+ 59	2.03	6.65:1	Central; long		2	Few infarcts
.994	+ 205	− 96	− 41	1.75	9.81:1	Eccentric		2	
.999	+ 385	− 92	− 13	1.56	10.18:1	Central		8	
.999	− 416	+ 58	+ 7	2.03	5.61:1	Central; long	1		
1.000	+ 125	+202	+ 35	2.35	5.19:1	Eccentric		4	Marginata
1.000	− 536	− 58	− 13	1.79	6.92:1	Central	1		Marginal infarcts
1.000	+ 85	+ 47	− 1	2.06	6.73:1	Central		3	
1.000	+ 120	−103	− 29	1.63	9.71:1	Central		5	
1.002	− 236	− 9	− 19	1.98	6.84:1	Central	1	2	Circumvallata
1.002	+ 120	− 8	+ 51	1.50	7.62:1	Central	1		
1.002	+ 520	+ 97	+ 24	2.05	6.89:1	Central			Few infarcts
1.003	−2041	−151	− 98	2.10	4.13:1	Eccentric		2	Fibrocalcareous
1.003	+ 185	− 93	− 3	1.49	9.59:1	Central		2	
1.003	+ 875	+ 72	+ 70	1.67	7.88:1	Eccentric		7	Few infarcts
1.004	− 101	+ 30	− 22	2.19	6.55:1	Marginal	1		Marginata
1.004	+ 540	+184	+ 69	2.00	5.96:1	Eccentric	1		
1.004	+ 590	+ 10	+ 22	1.74	8.32:1	Eccentric		3	
Above av.	12	10	9	10	7	Central 11	8	11	Marginata 4
Below av.	7	9	10	9	12	Eccentric 7			Slight degeneration 6
						Marginal 1			Negative 9
Male and Female									
Above av.	21	17	15	14	18	Central 15	11	24	Marginata 6
Below av.	14	18	20	21	17	Eccentric 18			Slight degeneration 11
						Marginal 2			Normal 18

*Ratio refers to the relationship of the weight of the newborn to that of the placenta.

TABLE IX

PLACENTAS OF HIGH SPECIFIC GRAVITY

Male

SPECIFIC GRAVITY	NEWBORN WEIGHT gm.	PLACENTA VOLUME gm.	PLACENTA SURFACE AREA sq. cm.	PLACENTA THICKNESS cm.	RATIO*	GRAVIDA P	GRAVIDA M	CORD INSERTION	REMARKS
1.062	± 0	− 61	− 30	1.83	8.00:1	1		Eccentric	Marginata
1.066	− 330	+ 32	− 8	2.05	5.86:1		2		Placenta praevia
1.070	+ 65	− 65	− 55	2.05	8.18:1		3	Eccentric	
1.071	+ 560	+ 31	+ 32	1.54	8.60:1		2	Eccentric	Marginal infarcts
1.071	−1127	−185	− 8	1.15	7.71:1		4	Eccentric	Toxemia of pregnancy
1.072	+ 10	− 65	+ 33	1.41	8.04:1		6	Eccentric	Slight toxemia
1.073	+ 610	+ 66	+ 4	2.09	7.10:1	1		Central	Marginata
1.073	− 840	−140	− 62	1.72	7.45:1	1		Eccentric	
1.083	− 620	− 31	− 26	1.93	6.19:1	1		Marginal	Large infarcts
1.090	− 270	− 90	+ 23	1.37	7.71:1	1		Marginal	
1.105	+ 360	+ 87	+ 32	1.96	6.22:1		2	Eccentric	Circumvallata; fatty infarcts
1.130	− 330	+ 60	+ 85	2.25	7.40:1		5	Central	Marginata
1.170	−1330	− 47	− 57	2.16	4.30:1		3	Eccentric	Premature
1.330	−2090	−300	−136	1.44	6.13:1		2	Central	Premature
Average	1					5	9	Eccentric 8	Premature 3
Above av.	5	4	5	7	8			Central 3	Placenta praevia 1
Below av.	8	10	9	7	6			Marginal 2	Marginata 4
								Unknown 1	Slight degeneration 3
									Normal 3

Female

TABLE IX—Cont'd

SPECIFIC GRAVITY	NEWBORN WEIGHT	PLACENTA VOLUME	PLACENTA SURFACE AREA	PLACENTA THICKNESS	RATIO*	GRAVIDA		CORD INSERTION	REMARKS	
	gm.	gm.	sq. cm.	cm.		P	M			
1.062	- 60	- 3	+ 5	1.80	6.74:1	1		Eccentric	Numerous infarcts	3
1.065	+ 445	+ 68	+ 49	1.77	6.71:1		11	Central		3
1.066	- 715	-111	- 13	1.48	7.02:1	1		Eccentric	White infarcts	3
1.066	+ 205	+ 39	+109	1.39	6.63:1	1		Eccentric		1
1.094	+ 300	+ 77	+ 58	1.75	6.69:1	1		Eccentric; long	Fibrous	4
1.100	- 50	-145	- 51	1.46	10.09:1		3	Eccentric		6
										6
Above av.	3	3	4	0	1	4	2	Eccentric	5 Slight degeneration	
Below av.	3	3	2	6	5			Central	1 Normal	
Male and Female										
Average	1					9	11	Eccentric	13 Premature	
Above av.	8	7	9	7	9			Central	4 Placenta praevia	
Below av.	11	13	11	13	11			Marginal	2 Marginata	
								Unknown	1 Slight degeneration	
									Normal	

*Ratio refers to the relationship of the weight of the newborn to that of the placenta.

placenta praevia, four placenta marginata, and six with slight degeneration. The rest of the newborns and the placentas were apparently normal.

Table X shows the low ratios in a similar manner. In this series there were thirty cases below 5.60:1. Of the thirty, only four of the newborn babies were above the average in size, while twenty of the placentas were equal to, or above the average. The placentas were about evenly divided between multiparae and primiparae, there being fourteen of the former, and sixteen of the latter. Of the four newborns above the average, the placentas of two showed degeneration with circumvallata, one had an irregular shape, and one had a long cord with very small vessels. Fifteen of the thirty were from premature infants, and five of these prematures had placentas above the average size for normal babies, which must mean a definite hypertrophy. Two of these five were from cases of toxemia of pregnancy, and one was a syphilitic placenta. In the other cases the cause of prematurity was not determined. However, the three due to placenta praevia and the one due to accident were below the average in size, but relatively large for the weight of the newborn.

These figures agree with those of other workers. Laurent (1913) stated that a syphilitic baby, born alive at term, might have a placenta equal to or above the average, but that a premature syphilitic had a hypertrophied placenta. Holland stated, "Far too much importance has been attached to the increased weight of the syphilitic placenta."

The other fifteen cases were from small newborns with relatively large placentas. In these, the following abnormalities were found in the babies: One had an encephalocele, the mother having hydramnios; one was a dead fetus, cause undetermined; and one had an enlarged thyroid, which prevented proper flexion of the head and produced mechanical obstruction to respiration. In the placentas, the following conditions were found: Three showed marked degeneration; three had marginal insertion of the cord; one had a very short cord. One mother had the history and findings of beginning toxemia. There is apparently a natural and a pathologic cause for low ratios. In the first place, the placenta is relatively large during the early months of pregnancy, the ratio decreasing until birth. A baby born prematurely for causes other than pathologic conditions in the placenta, will usually have a low ratio. On the other hand, in pathologic cases, notably toxemias, there may be an actual hypertrophy of the placenta.

Table XI gives an analysis of the high ratios between the weight of the baby and the weight of the placenta. It is evident that a high ratio may be due either to a very large baby or to a small placenta. In this series of twenty-seven cases with a ratio above 9:1, seventeen

TABLE X

LOW RATIO BETWEEN WEIGHT OF NEWBORN AND WEIGHT OF PLACENTA

Male

RATIO*	DEVIATIONS FROM NORMAL		GRAVIDA		REMARKS
	NEWBORN WEIGHT	PLACENTA WEIGHT	P	M	
	gm.	gm.			
5.44:1	+ 205	+190		2	Fibrous
5.32:1	−1790	−170	1		Premature; toxemia of pregnancy
5.32:1	− 220	+125	1		Small baby; hydramnios; encephalocele
5.29:1	+ 400	+245	1		Irregular shape; varying in thickness; infarcted
5.10:1	−2035	−205	1		Premature; toxemia of pregnancy
4.97:1	− 880	+ 35		2	Small baby; persistent O. D. P.; forceps delivery; short cord
4.90:1	−2900	−370	1		Premature; dead fetus; marginata
4.78:1	− 830	+ 65		2	Premature; dead fetus; pale placenta; degenerate
4.57:1	−1015	+ 50		3	Premature; dead fetus; marginata
4.45:1	−2305	−255		4	Premature; marginata; degenerate
4.41:1	− 725	+135	1		Small baby; early toxemia; white infarcts
4.39:1	−2390	−241		5	Premature; habitual abortion
4.30:1	−1330	+ 10		3	Premature?
4.16:1	−1128	+ 75		3	Premature; mother, positive Wassermann reaction
3.69:1	−2210	−147	1		Premature
3.58:1	−1020	+195		5	Premature; dead fetus; circumvallata; toxemia
2.93:1	−2280	− 85	1		Premature; placenta praevia
2.13:1	−2361	+ 25	1		Premature; circumvallata; toxemia
			9	9	
Above av. 2		11			
Below av. 16		7			

Female

5.53:1	− 321	+ 70	1		Fibrocalcareous degeneration
5.39:1	+ 390	+215		4	Cord 90 cm.; vessels very small
5.37:1	− 30	+140	1		Marginal insertion of cord; few infarcts
5.32:1	− 366	+ 82	1		Baby had enlarged thyroid with mechanical obstruction
5.33:1	− 801	± 0	1		Marginal insertion of cord; few infarcts
5.19:1	+ 125	+190		4	Circumvallata; very degenerate; large cord
5.10:1	− 10	+187	1		Marginata
5.05:1	− 780	+ 30		3	Marginal insertion of cord; three large penetrating infarcts
5.10:1	− 521	+ 85	1		High specific gravity; otherwise normal
4.80:1	−1191	− 30		10	Premature; placenta praevia
4.13:1	−2041	−160		2	Premature; accident; cord 25 cm. long; low specific gravity
4.89:1	−2131	−225	1		Premature; circumvallata; bleeding; placenta praevia
			7	5	
Average		1			
Above av. 2		8			
Below av. 10		3			

Male and Female			16	14	
Average		1			
Above av. 4		19			
Below av. 26		10			

TABLE X—CONT'D

		M	F	M and F
Newborn above average	Degenerate; fibrous; circumvallata	1	1	2
	Irregular shape	1		1
	Long cord; very small vessels		1	1
Newborn below average	Hydramnios; encephalocele	1		1
	Short cord	1		1
	Dead fetus; degenerate placenta; cause unknown	1		1
	Signs of early toxemia	1		1
	Enlarged thyroid		1	1
	Marginal insertion of cord with infarcts		3	3
	Degeneration in placenta		3	3
Premature	Toxemia of pregnancy	~		'4
	Placenta praevia	1	2	3
	Syphilis; stillbirth	1		1
	Accident		1	1
	Cause undetermined	6		6
		18	12	30

*Ratio refers to the relationship of the weight of the newborn to that of the placenta.

of the babies were above average weight, and ten below, while only three of the placentas were above average, twenty-four being below. This would indicate that a high ratio is usually due to a small placenta and might substantiate the theory that a fetus can outgrow its placenta and die in utero as a result of insufficient placental tissue, although our series shows that babies can survive with a ratio between the weight of the newborn and placenta of 11:1. Sfameni (1901) reported one with a ratio of 12:1. Holland reported ten intrauterine deaths, cause unknown, with placentas having ratios from 10.7:1 to 13.5:1.

It is also significant that twenty-three of the twenty-seven cases were multiparae and only four primiparae. Furthermore, the four primiparae had unusually large babies. Of the seventeen babies above the average, twelve had placentas that were apparently normal, and the remaining five showed only slight degeneration. Since most of these cases were multiparae and it is known that primiparae often deliver before the calculated date, it seems probable that the high ratio was due to a postmature baby. Of the ten babies below the average, the placenta of one was apparently normal, three showed slight degeneration, one gave a history of syphilis, one had a marginal insertion of the cord, and four were definitely pathologic pregnancies with marked degeneration of the placentas.

A study was also made of the placentas with a marginal attachment of the cord (Table XII). There were twenty-six in the series, or 6 per cent. Twenty-one of the twenty-six babies were below the average size. The placentas were slightly below the average in weight and surface area and showed quite marked degeneration in the form of

TABLE XI

HIGH RATIO BETWEEN WEIGHT OF NEWBORN AND WEIGHT OF PLACENTA

Male

RATIO*	DEVIATIONS FROM NORMAL		GRAVIDA		REMARKS
	NEWBORN WEIGHT	PLACENTA WEIGHT	P	M	
	gm.	gm.			
11.35:1	− 555	−225		4	Marginal insertion of cord; infarcts
11.07:1	− 395	−205		4	Large marginal infarcts
10.86:1	+ 850	+ 85	1		
10.82:1	+ 300	−190		2	Marginata
10.53:1	−1965	−340		2	Premature; marginata
10.53:1	+ 90	−145		2	
10.52:1	+ 140	−140		4	
10.00:1	+ 360	−100		4	
9.68:1	− 340	−160		4	Few infarcts maternal surface
9.75:1	− 320	−160		2	Fibrous
9.62:1	+ 170	−105	1		White infarcts margin
9.32:1	− 875	−205		3	Father history of syphilis
9.34:1	+ 343	− 75		8	
9.15:1	+ 85	− 95	1		
9.15:1	+ 980	+ 3		2	
9.11:1	+ 360	− 63		2	
			3	13	
Above av.	9	2			
Below av.	7	14			

Female

RATIO*	DEVIATIONS FROM NORMAL		GRAVIDA		REMARKS
	NEWBORN WEIGHT	PLACENTA WEIGHT	P	M	
11.02:1	+ 690	−105		5	
10.70:1	+ 520	−110	1		Few small infarcts; low specific gravity
10.70:1	− 391	−195		4	Marginata
10.18:1	+ 385	−105		8	Low specific gravity
10.09:1	− 50	−145		3	
9.72:1	− 411	−170		4	Marginata; early toxemia
9.81:1	+ 205	−110		2	Low specific gravity
9.72:1	+ 320	+ 95		4	Few infarcts margin
9.59:1	+ 185	−103		2	Fibrocalcareous degeneration
9.39:1	+ 195	− 95		3	Marginal infarcts
9.39:1	+ 130	−102		3	
			1	10	
Above av.	8	1			
Below av.	3	10			

Male and Female			4	23	
Above av.	17	3			
Below av.	10	24			

SUMMARY

		M	F	M and F
Newborn above average {	Apparently normal	8	4	12
	Mild degeneration	1	4	5
Newborn below average {	Marginal insertion of cord	1		1
	Marginata	2	2	4
	Slight degeneration	3		3
	History of syphilis; small baby	1		1
	Apparently negative; only slightly below average		1	1
		16	11	27
Multiparae with placentas relatively small for newborn		13	10	23
Primiparae with placentas relatively small for newborn		3	1	4
		16	11	27

*Ratio refers to the relationship of the weight of the newborn to that of the placenta.

marginata and infarcts. These placentas apparently did not have the power to meet properly the demands of the growing fetus. They may be classed with the group of "relatively insufficient."

Table XIII shows a comparison of the placentas of multiparae and primiparae for the different weights of the newborn. The total average of the weight of the placentas of multiparae is higher than that of those from primiparae, but for the infant weights ranging from 2500

TABLE XII

MARGINAL INSERTION OF CORD

NEWBORN WEIGHT	PLACENTA WEIGHT	PLACENTA SURFACE AREA	SPECIFIC GRAVITY	THICKNESS	GRAVIDA		RATIO*	REMARKS
					P	M		
gm.	gm.	sq. cm.		cm.				
− 620	− 25	− 26	1.083	1.93	1		6.19:1	Large white infarcts
− 270	− 69	+ 23	1.090	1.37	1		7.71:1	
+ 460	+ 50	+ 18	1.017	1.36		7	7.35:1	Marginata
− 160	− 85	− 21	1.023	1.68	1		8.30:1	Marginal infarcts
+ 330	+ 10	+ 22	1.016	1.77		3	7.69:1	Marginal infarcts
− 220	+ 25	+ 61	1.047	1.55		9	6.37:1	Marginata
− 315	− 65	− 45	1.048	1.93	1		7.55:1	Infarcts
− 525	−135	− 47	1.021	1.66		3	8.44:1	Marginal infarcts
− 610	−110	− 53	1.011	1.85	1		7.64:1	
− 770	−160	−101	1.035	2.08	1		8.34:1	Pale; friable
− 880	− 85	− 37	1.000	1.85		3	6.48:1	Marginata
−2361	+ 25	− 48	1.048	2.38	1		2.13:1	Marginata
+ 345	+ 90	− 43	1.055	2.61		3	6.64:1	Fibrocalcareous
− 300	+ 85	− 27	1.046	2.42	1		5.55:1	Fibrous
− 360	−110	+ 37	1.036	1.24		3	8.32:1	Large white infarcts
− 555	−225	− 76	1.058	1.38		4	11.35:1	Fibrous infarcts
− 101	+ 20	− 22	1.004	2.19	1		6.55:1	Fibrous infarcts
− 30	+140	+ 31	1.045	2.10	1		5.37:1	Fibrous infarcts
− 801	± 0	+ 34	1.026	2.16	1		5.33:1	Fibrous infarcts
− 780	+ 30	+ 6	1.025	1.93		3	5.05:1	Three large infarcts
+ 205	+ 80	− 20	1.028	2.36		4	6.39:1	Fibrous
− 181	− 72	+ 53	1.048	1.36		2	7.88:1	
− 866	−110	− 76	1.023	2.06	1		6.8 :1	White infarcts
− 816	− 75	− 16	1.010	1.69	1		6.32:1	Marginal infarcts
− 231	− 60	− 57	1.022	2.11	1		7.53:1	Fibrous
+ 200	− 8	+ 18	1.015	1.54	1		7.61:1	Fibrous
					15	11		
Average	1		1					
Above av. 5	10	10	12	13			13	
Below av. 21	15	16	13	13			13	

*Ratio refers to the relationship of the weight of the newborn to that of the placenta.

to 4000 grams, the placental weights for primiparae were higher than those for multiparae. Above 4000 grams, the reverse is true. There were, however, only eight placentas of primiparae in this group. The same relation was found in the volumes for the two groups. For the surface area the same relations hold, but for the placentas of primiparae it was greater than for those of multiparae in the group of newborns weighing 3000 to 4500 grams. The specific gravity was great-

TABLE XIII

ANALYSIS OF PLACENTAS ACCORDING TO NEWBORN WEIGHT AND PARITY OF MOTHER

NEWBORN WEIGHT GROUPS gm.	NUMBER OF CASES		NEWBORN WEIGHT		PLACENTA WEIGHT		PLACENTA VOLUME		PLACENTA SURFACE AREA		SPECIFIC GRAVITY		RATIOS	
	M	P	M	P	M	P	M	P	M	P	M	P	M	P
2000-2499	8	7	2331	2395	414	380	406	372	227	228	1.022	1.020	6.07:1	6.35:1
2500-2999	43	33	2797	2783	383	405	381	397	218	210	1.028	1.026	7.34:1	7.04:1
3000-3499	75	64	3272	3231	444	467	429	454	237	249	1.033	1.029	7.65:1	7.05:1
3500-3999	64	29	3716	3708	496	526	452	513	259	274	1.027	1.028	7.66:1	7.25:1
4000-4499	31	7	4147	4145	584	552	571	542	282	292	1.027	1.017	7.26:1	7.71:1
4500-4999	7	1	4672	4980	717	630	704	627	328	245	1.017	1.004	6.66:1	7.90:1
5000-5500	1		5325		770		753		375		1.022		6.92:1	
Total Averages	229	141	3449	3246	475	466	463	454	249	246	1.029 −	1.027 +	7.45:1	7.10:1

M—Multipara.
P—Primipara.

est in the placentas of infants weighing from 3000 to 3500 grams. There was such a great variability in the specific gravity that it was difficult to determine the significance of these findings.

The weight ratios in primiparae increase from 6.35:1 for the infant group weighing from 2000 to 2500 grams, to 7.9:1 in the group weighing 4500 to 5000 grams. The ratios of the group from 2500 to 4000 grams are lower in primiparae than in multiparae. The others are higher. In multiparae the ratio increases up to the 4000 grams and then falls again. In the averages for all the figures the ratio is higher for multiparae than for primiparae.

Sfameni (1901) separated the multiparae and primiparae, but gave only the average for the entire group, and, as in our figures, the weight of the placentas for multiparae was higher than for primiparae. Krüger separated his also, but he grouped his cases according to the weight of placentas. A study of his tables, however, showed that his results confirm ours. Thus, for the placentas weighing between 600 and 699 grams, the weight of primiparous newborns was 3236 and that of multiparous newborns was 3390, while the weight of multiparous newborns was 3240 in the group of placentas weighing 500 to 599 grams. The 3240 grams was very close to the 3236 grams of the first group.

CONCLUSIONS

1. A positive correlation exists between the weight of the newborn and (a) the weight of the placenta; (b) the volume of the placenta, and (c) the surface area of the placenta.

2. Thin placentas are either proportionately small or a disproportion between the volume and the surface area exists, due to some pathologic condition.

3. Thick placentas, in the same way, are either proportionately large placentas or have a disproportion between the volume and the surface area.

4. The average specific gravity is 1.028. The more nearly perfect placentas have a low specific gravity and the degenerating placentas have higher specific gravity.

5. A low ratio of the weight of the baby to the weight of the placenta is found in prematures, very small babies which are really on the borderline of prematurity, and in pathologic cases, especially those where toxemia of pregnancy is present.

6. A high ratio is found chiefly in postmature or large infants.

7. A marginal insertion of the cord indicates a pathologic placenta and almost always means a small baby.

8. The average weight, volume, and surface area are higher for placentas from multiparae than for those from primiparae, but between the birth weights 2500 and 4000 grams, the weight and volume of those

from primiparae are higher than those from multiparae. The surface area is greater for primiparous placentas between the birth weights 3000 and 4500 grams. The ratio is lower for primiparous than for multiparous placentas between the birth weights 2500 and 4000 grams.

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PRELIMINARY REPORT OF PRIMARY CARCINOMA OF THE CERVIX UTERI TREATED WITH RADIUM IN THE WOMAN'S HOSPITAL IN THE STATE OF NEW YORK*

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IN February, 1919, the Board of Governors of the Woman's Hospital, upon the request of Dr. George Gray Ward, the chief surgeon of the hospital, purchased 250 milligrams of radium salt. The present report is based upon the use of this amount of radium in cases of cancer of the cervix uteri in the past six years and is presented by the kind permission of Dr. Ward with whom I am associated and under whose supervision all the ward cases come and who has directed the dosage and personally seen the cases in the Follow-up Clinic. The ward cases were from the beginning assigned to the first division in the hospital of which Dr. Ward is the attending surgeon, in order that the dose of radium should be uniform, and this report includes all the ward cases of cancer of the cervix treated with radium and also the private patients of Dr. Ward and my own patients, as I have employed the same dosage and technic. The private patients of other physicians are not included merely from the desire to know what the results are by the present methods of treatment. Radium

alone, either in a tube or in needles or both together, has been the
only treatment given the cases on which this preliminary report is
based. A Wertheim operation has been done after irradiation in sev-
eral cases but the follow-up end-results will appear in a later report.
X-ray treatment together with radium, we have not used at the Wom-
an's Hospital until the past six months and these cases are too recent
to be included in this paper. This report, then, includes all classes of
primary carcinoma of the cervix—the early, borderline or advanced,
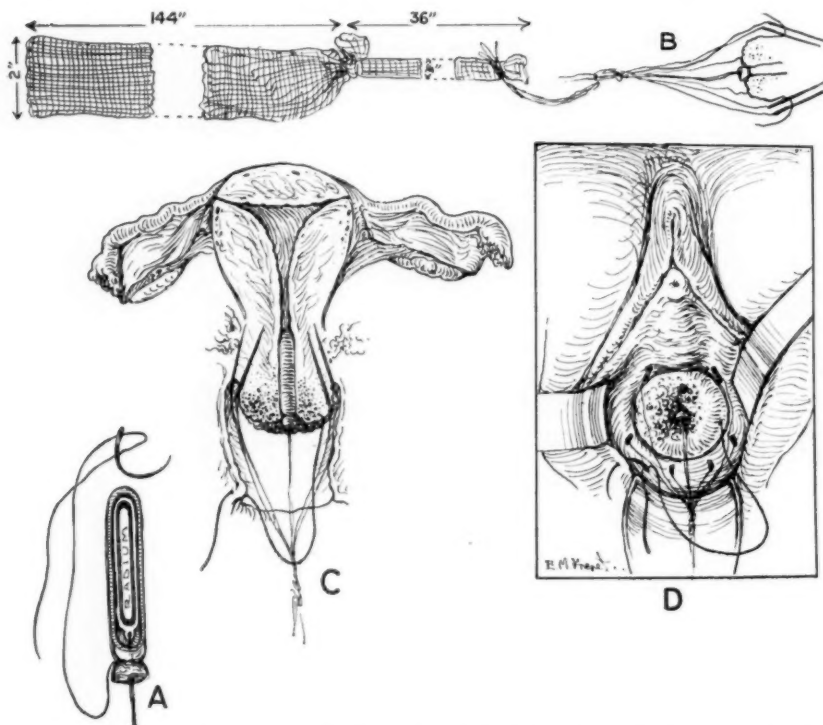who were treated with radium alone.

Fig. 1.—Technic of the application of radium tube and needles in carcinoma of
cervix. *A*, radium salt in glass and silver capsule with 1 mm. brass and rubber
screening. Note the tying of the silk threads, one with needle ready to anchor to
tissues, and one attached to gauze packing. *B*, silk threads from tube and needles
knotted together and tied to gauze packing. *C*, radium tube *in situ* in cervical canal
and needles outside the cervix in adjacent tissue. Note anchoring suture passing
through the cervix and vulva. *D*, front view showing needles under the bladder
and in the uterosacral ligaments and in the broad ligaments posterior to the midline
to avoid the ureters and blood vessels.

The preparation and dosage are as follows: The radium salt is
in a glass capsule (100 mg.) contained in a silver tube, which is
in turn placed in a brass tube 1 mm. in thickness. This brass tube
when ready for use is put into a rubber tube. We have found
the rubber ink container of fountain pens to be of sufficient thickness
(1 mm.), very inexpensive and of suitable length for use. The open
end of the rubber tube is securely tied with two strands of braided silk

approximately 16 inches long and these are tied to two strands of silk previously drawn through the eyelets in the brass tube, thus ensuring the recovery of the brass tube should by any chance the rubber tube be torn in removing the radium. After sterilization in alcohol for
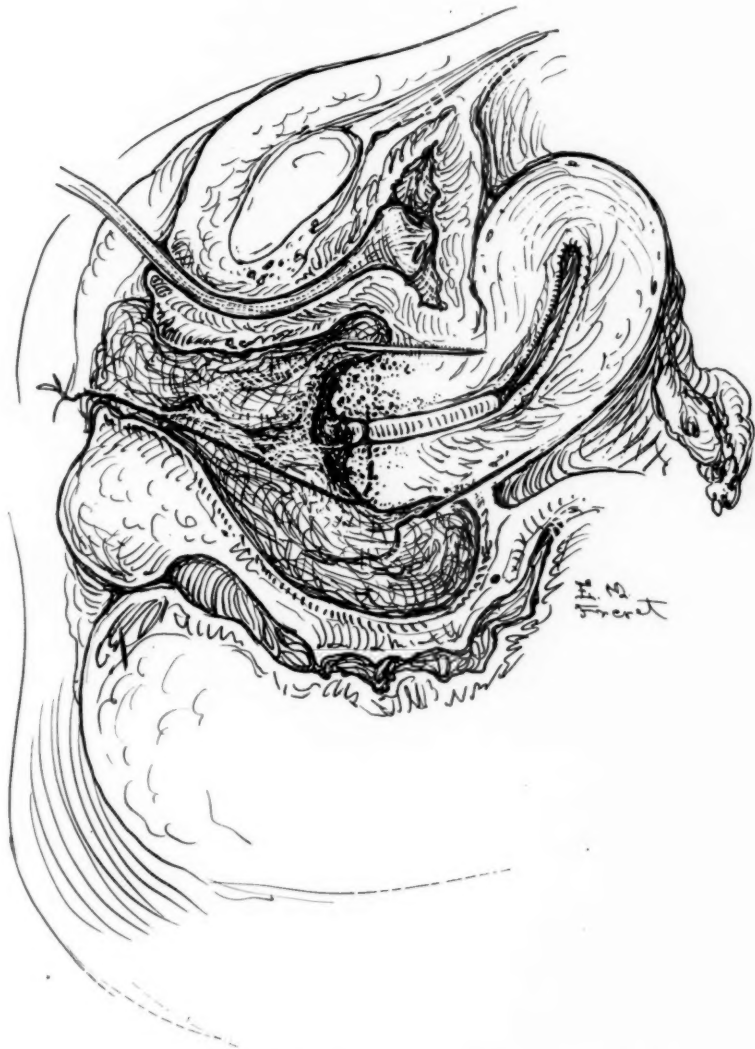
Fig. 2.—*A*, sagittal section showing the wide distention of the vagina with gauze packing and the position of radium tube with anchoring suture and radium tube and needles *in situ*.

ten minutes of the rubber covered tube containing radium, the ends of the silk are tied to an 18 inch piece of ¼ inch gauze (which is to be packed in the cervical canal if wide enough to permit doing so) and this in turn is tied to a two yard strip of two inch gauze, which is

to be used to distend the vaginal canal. One of these strands of silk is threaded into a needle which passes through the cervix, after the tube containing the radium is placed against the carcinomatous growth in the cervix to ensure the radium remaining in position, and this strand of silk is held taut by the assistant while the vagina is tightly packed with the wide gauze to keep the bladder and rectum as far from the radium rays as possible. When the vagina is packed, this
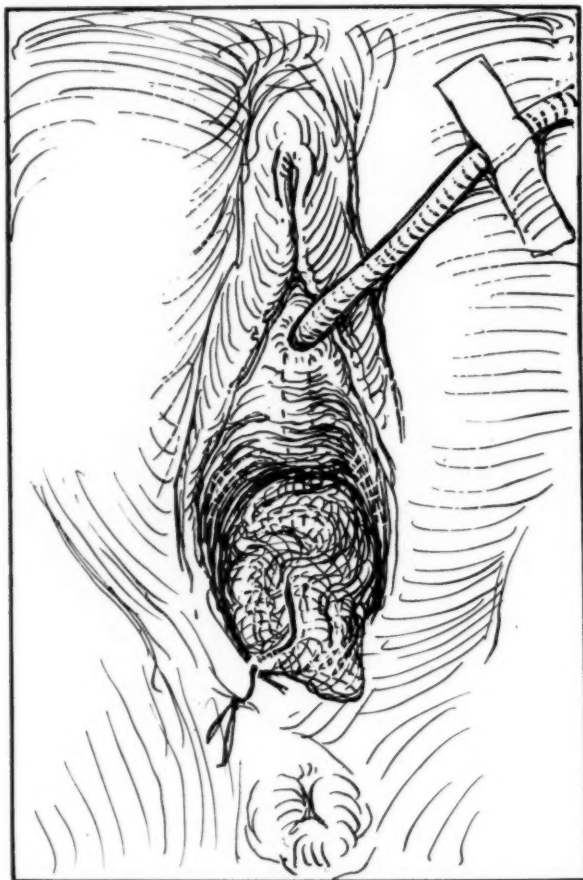
Fig. 3.—Showing the self-retaining catheter *in situ* and gauze pack in vagina.

silk is wiped carefully with iodine and fastened to the vulva orifice. The intern in removing the radium needs only to cut this stitch at the vulva and pull out the wide gauze, the narrow gauze must follow and then the radium; should the patient get out of bed before it is time for the radium to be removed the tube cannot be lost as it is securely tied to the vulva. The patient is prepared as for a vaginal operation and general anesthesia is given, usually nitrous oxide gas is sufficient. It is thought advisable to give a general anesthetic to

facilitate a thorough examination of the pelvic organs, for frequently what seems to be an early case of carcinoma is found to belong to the advanced class, and also to pack the vagina more fully with gauze as the freedom of irritability of bladder and rectum depends in great measure on the distention of the vaginal canal. Early in the use of radium we found the nurses were obliged to call an intern at night to remove the gauze packing in the vagina in order to catheterize the patients who were unable to void. We then placed a mushroom catheter in the bladder when the radium was introduced into the cervix to keep the gauze undisturbed in the patient and the internes undisturbed in bed; with satisfaction to both parties.

A punch is used to remove several pieces of tissue for pathologic diagnosis before the radium is placed *in situ* and care is taken to injure the tissue as little as possible. It has been found by experience that cases treated with radium do better if preliminary care is given to the general health before administering the radium. If a patient is suffering from anemia we have found it advisable to give a blood transfusion before the radium and if the general resistance seems low to try rest and tonic treatment for a few days previous to administration. There is always a local destruction of tissue by the radium and by throwing into the system more toxins a marked prostration may follow from which a patient is slow to recover. We permit patients to sit up as soon as the nausea is over, which is often when the radium is removed or the next day, and then let them get out of bed even though running a temperature, believing they have better drainage and absorb less by so doing. Douches of potassium permanganate are started the day after the radium is removed to flush out the purulent discharge and patients are told to douche daily after leaving the hospital. Patients are urged to live out of doors and make an effort to gain weight, as we believe the beneficial effect of radium depends in part on the general body resistance. There must be a comeback in the tissues to get results from radium.

Since our recent compiling of end-results the work of the radium follow-up cases has been placed under the direct supervision of the head of the Social Service Department and a card index is being made of the housing conditions of each patient. We believe a great deal can be accomplished in this way to get favorable results in the cancer cases.

Before I speak of the dosage, I would like to take a moment to consider the effect of radium salts on carcinomatous tissue and just what it is we hope to accomplish by giving a case of cancer of the cervix radium treatment, and upon what we base the dosage.

I will quote freely from a recent article, "An Analysis of Radiation Therapy in Cancer," by Dr. James Ewing who says, "One can extricate

and emphasize one principle of radium therapy, viz., that radiation is capable of restraining the growth of tumor cells without causing either autolysis or necrosis''; and ''Radium action is exerted on proliferating connective tissue. For the first time in the history of medicine we are in possession of an agent which will control the growth of connective tissue.'' * * * ''From the study of much material, from operation and autopsy, in cases treated by deep radiation, I have become convinced that the clinical results are *not* usually due to the direct killing effect of radiation but are generally brought about indirectly and mainly by interference with the circulation— capillary, venous, arterial, and lymphatic. In many cases the main part of the destruction has been caused by occlusion of blood vessels.''

In an admirable article by Dr. John Clark and Dr. Keene of Philadelphia, the healing process in the cervix after radium application is described as, ''first, local destruction, then a considerable fibrous and tissue formation, with an ultimate condensation cicatrix followed by more or less hyalinization.'' ''To the latter process,'' Dr. Clark says, ''we attribute the chief possibilities of a cure. To thrive, cancer requires vascularization on its frontier zone. A hyaline or fibrous barrier is, therefore, an effective block against the invasion of new blood vessels and serves excellently in the process of incarceration or segregation of malignant cells.'' Dr. Clark quotes Dr. McCarty of the Mayo Clinic as laying especial emphasis on the beneficence of the latter processes in the retardation or starving out of cancerous growths. We know that there are few blood vessels in dense scar tissue and in order that cancer cells should thrive there must be a sufficient blood supply at its border. Cut off that blood supply and cancer cells are isolated.

If we watch for six to eight weeks the clinical process going on in cervical cancer that has been treated with radium we see,

1. A hyperemia of the tissues.

2. A local destruction or breaking down of tissue and profuse purulent discharge with more or less absorption and possibly toxic symptoms if the destruction of tissue is great or the patient cachectic.

3. A local sloughing area in the cervix.

4. Diminishing slough in the cervix and a beginning healing process going on around the margins of the cervix.

5. Complete healing of the cervix which is now red and hyperemic, and there is now a complete disappearance of the slough.

6. Finally, complete cicatrization with marked contraction of the tissue of the cervix which is now shrunken, firm in consistency and pale in color. Until this stage is reached we do not consider the patient has had sufficient radium.

DOSAGE

The initial dose of radium has been 100 milligrams in a single tube placed within the cervix and left for twenty-four hours, with needles if there is involvement of the vagina, bladder or rectum. In young women under thirty in whom cancer cells are more resistant, the dose has been 100 milligrams for thirty to thirty-six hours. We have used this dose for all types of cancer cells and for all classes of involvement of the cervix by cancer, considering it to be merely a *therapeutic* or *test dose* and have been guided in subsequent treatments in the case by the result obtained by this initial dose. *Every case of cancer of the cervix is a study by itself.* There can be no uniform dose in successful treatment of cancer. Cases with the same type of cell and same stage of involvement by cancer vary greatly in their response to the initial dose. What is sufficient to cause a complete disappearance in one case and no recurrence for a five or six year period, is not sufficient to retard the growth for six to eight weeks in another case exactly similar to the first as far as the local lesion appeared. We know that radium has a selective action on tumor cells and that a dose of radium sufficient to hold in abeyance a malignant growth will not injure normal cells. We, therefore, do not try to give a killing dose to the tissues, believing, to quote Dr. Ewing again, "that ideal radium therapy seems to require a nice adjustment of relations between destructive effect on tumor cells and stimulation of stroma cells." "In further support of the view that radiation therapy tends to employ and support nature's method of healing" rather than by prolonged radiation to produce such extensive tumor necrosis that the patient dies from hemorrhage or septic absorption from the decomposition products of the tumor, producing, as Dr. Ewing states, those rapid terminal extensions of the disease which many observers have regarded as accelerations of growth from the stimulating effects of radiation.

A patient leaves the hospital usually at the end of a week, later, if her condition is not satisfactory, and reports to the Follow-up Clinic in one month; and from then on makes one visit each month to the clinic. If at the end of eight weeks from the first radium treatment a pale cicatrix has not formed or healing is not definitely progressing in the cervix, a second radium treatment is advised. The same dose is given or the dose is increased, according to the response of the initial dose, remembering that subsequent doses need to be greater to overcome the resistance offered by the scar tissue now formed in the cervix. In cases which do not show satisfactory retrogression of the cancerous involvement, we give a third or even fourth treatment, increasing the dose as seems advisable, and some of the best results have been in cases having several treatments. Perhaps

the reason for this success may be, to quote again from Dr. Ewing, that "tumor tissues undergo progressive fibrosis but usually groups of tumor cells persist in the scar tissue and later give rise to recurrence." "When one proceeds in deep therapy on the theory that therapeutic results depend not only upon injury to tumor cells but also upon defense reaction of the body and the tissues, the immediate results seem to be almost equally striking, the end-result is often more satisfactory and the treatment is conducted with less damage and danger to the patient."

RESULTS

The cooperation of the patients in the Follow-up Clinic has been remarkable; over 90 per cent of the patients have reported regularly and of the remaining 10 per cent or less, the Social Service Department has been able to trace all but eight by home visits, visits to friends of patients, and by visits to the Board of Health to inspect the list of the death certificates for the year.

It is now six years since we first began radium treatment in the Woman's Hospital and from February, 1919, to February, 1923, 196 have been treated and deducting eight cases the number to be reported on is 188. I have deducted the eight cases instead of calling them dead, as recently in reviewing our follow-up, six patients whom we had on the list as dead, as they had not reported in the follow-up in one and one-half to four years, walked into the clinic, every patient well and clinically free from carcinoma. So I have stopped "killing" them and will report only the cases seen, as being fairer to the statistics. Forty cases are in the two year period, twelve cases had radium and operation, and three cases were secondary carcinoma, so the number to be reported is 133. Since 1919, there are four periods of three years each and I will take up these three year cases, reserving the five year cases for the report to be given at the end of the month at the meeting of the American Medical Association as the list is not yet completed. This report includes all classes, grouped according to Schmitz' classification of primary carcinoma of the cervix uteri.

THREE YEAR END-RESULTS OF PRIMARY CARCINOMA OF THE CERVIX TREATED WITH RADIUM

	CLASSES I AND II. (OPERABLE)				CLASSES III AND IV. (INOPERABLE)				
Years	No.	Traced	Living	Per cent	No.	Traced	Living	Per cent	Total per cent
1919	11	10	4	40%	32	31	7	22.5%	26.8%
1920	7	7	7	100%	26	24	10	41.6%	54.8%
1921	9	8	6	75%	21	21	7	33.3%	44.8%
1922	7	6	6	100%	26	26	11	42.3%	53.1%
TOTAL	34	31	23	74.1%	105	102	35	34.3%	43.6%

All Classes I to IV, 133 cases traced, 58 cases living, 43.6 per cent total.

CONCLUSIONS

1. Every case of cancer of the cervix uteri should be studied individually.

2. The successful result does not depend entirely upon the direct killing of cancer cells but also upon the cicatrization of the cervix and occlusion of the blood vessels.

3. The first dose of radium should be a therapeutic dose.

4. The subsequent dose should depend upon the amount of healing and cicatrization seen six to eight weeks after the initial dose.

5. Repeated doses of radium may be necessary to arrest the tumor cells persisting in the cicatrix.

6. Since results of radium treatment depend also on the defense reaction of the body and tissues, every effort should be made to secure for the patient a favorable environment following the treatment; and especially have we found it advantageous to use blood transfusions as an aid to this end.

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611 WEST ONE HUNDRED AND TENTH STREET.

GYNEPLASTIC REPAIRS FOLLOWING CHILDBIRTH*

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THE status of the obstetrician and the range of his work have changed considerably in the last half century. Even the layman is beginning to recognize the somewhat erratic course of Nature in what has always been considered a normal, physiologic process. The care of the parturient woman in the present day involves much more than the delivery. Modern obstetric practice includes: 1. Prenatal care, necessitating a general examination, measurements, and noting of abnormalities. Bad teeth, tonsils, and other foci of infection are corrected, if possible. The growth and position of the fetus, the condition of the breasts, bowel movements, urine, blood pressure, and diet are regularly observed. By this careful prenatal attention such complications as eclampsia, toxemia, etc., have become almost extinct.

2. Natal care necessitates the use of strictest asepsis and antisepsis in delivery. Before the days of Semmelweis and Lister, the maternal mortality, in the hospitals, due to infections, varied from 18 to 30

per cent. Since then, it has been reduced to less than 1 per cent. Version, episiotomy, cesarean section, forceps, and other means of shortening the labor period are being used more frequently and are comparatively safe in the hands of the expert. The suffering during labor and childbirth is alleviated by various known methods.

3. The postnatal care consists of rest in bed for a certain number of days, followed by regulated exercises, diet, etc. Involution and position of the uterus are observed at stated intervals after the patient leaves the hospital.

In reviewing the scope of modern obstetrics, the question arises— Has our treatment of the multipara been complete? What of the chronic invalidism so common in women as a result of unrepaired lacerations of the genitalia due to childbirth, and aggravated by subsequent deliveries?

Soon after the opening of the new Mt. Sinai Hospital of Cleveland, in 1916, I was able to carry out a procedure which I had been planning for a long time, i.e., to repair old lacerations of the genitalia shortly after childbirth. There has been an accepted theory that this is impractical by reason of the edema, congestion, and friability of the tissues. The presence of the lochia and the dangers of infection and hemorrhage were also feared. It was, therefore, with some hesitancy that I operated upon the following case:

CASE 1.—Mrs. G., aged 40, para x. After a normal delivery, examination of the genitalia showed a large cystocele, rectocele, and hemorrhoids. A gyneplastic repair had been advised some years before, but due to household cares, expense, timidity, etc., this was not done. One week after the delivery, the patient was taken to the operating room and a complete repair was performed. Convalescence was uneventful and the operative results were most gratifying.

After this successful beginning, other multiparae were operated upon in like manner. We gradually shortened the time between the delivery and repair and, in 1920, I reported two cases that were satisfactorily repaired immediately after the expulsion of the placenta.

Since then it has become a routine procedure for the obstetrical staff of Mt. Sinai Hospital, of Cleveland, to repair practically all old lacerations immediately or within a week after delivery.

As a result of this routine, 169 cases were operated upon during the year 1922, including 156 done immediately, and 13 at intervals during the first week. To date, a great many more have been successfully repaired. The parity of the patients is indicated in Table I.

TABLE I

PARA	II	III	IV	V	VI	VII	VIII	IX	X
NO. OF CASES	68	51	22	16	4	4	2	1	1

INDICATIONS

There are very few women who do not have some pathologic condition present due to previous confinements, varying from mild to extreme lacerations resulting in the usual gynecologic complaints and disabilities. It is, therefore, for the following reasons that operative procedure is indicated.

First, to prevent the mild cases from becoming incurably chronic and to give the more severe cases relief and renewed health.   The patients come to the hospital assured that symptoms from which they have suffered, as a result of old lacerations, will be much improved after their confinement.

Second, from an economic standpoint, the operation is commendable. Table II shows that the stay in the hospital is not unduly prolonged as it is our routine to keep obstetrical cases at least fourteen days. The recuperation following a confinement and repair may be

TABLE II

NO. OF CASES	37	39	36	18	27	9	4	2	2
NO. DAYS IN HOSPITAL	14	15	16	17	18	19	21	22	23

slightly prolonged, but the end-results are sufficiently satisfactory to warrant the short added period of convalescence. The patient is thus spared the trouble and expense of entering the hospital at a later date, and the added inconvenience of arranging for the care of her family a second time.

Third, the immediate physical suffering is not greater than occurs after a repair of new lacerations.

Fourth, with the proper care, technic, and cooperation between the surgeon, assistants, and anesthetist, a considerable amount of repair can be done in a short time, without adding any appreciable amount of discomfort or danger to the patient.

Fifth, contrary to previous teachings, the tissues heal very satisfactorily and do not seem to be affected by the presence of the lochia.

Operative deliveries are not contraindications as is clearly demonstrated by Table III.

TABLE III
TYPES OF DELIVERIES

DELIVERY	SPON-TANEOUS	LOW FORCEPS	MID FORCEPS	VERSION	BREECH
NO. OF CASES	99	54	5	8	3

There are, however, a few contraindications, namely, a known or suspected infection, extreme weakness, postdelivery shock or hemorrhage, phlebitis, very large varicosities, or the presence of a respiratory disease which prohibits a prolonged anesthetic. Table IV shows the types of operations performed.

TABLE IV

TYPES OF OPERATIONS

TYPE OF OPERATION	TRA.	TRA. PER.	TRA. CYS.	TRA. CYS. PER.	PER.	PER. CYS.	HEM.	CYS. PER. HEM.	TRA. PER. HEM.
NO. OF CASES	29	71	1	7	43	10	3	1	4

Tra.—Trachelorrhaphy;   Per.—Perineorrhaphy;   Cys.—Cystocele;   Hem.—Hemorrhoidectomy.

TECHNIC

We have found that the best results are obtained by adhering to the following technic: The strictest antiseptic and aseptic precautions are observed before, during, and afer the delivery. The operation should be done in a well-regulated maternity hospital with efficient assistants and anesthetists.

On admission to the hospital, the patient is given a thorough general examination. The blood pressure is taken and a specimen of urine examined. A complete blood count is made if indicated. After an enema, the lower abdomen and vulva are shaved, thoroughly cleansed with soap and water, and irrigated with a mild antiseptic solution. Only rectal examinations are made to determine the amount of cervical dilatation and the progress of labor. When the pains occur about every five minutes and the cervix is two finger breadths, dilated, the morphine-scopolamine course is started to conserve the strength of the patient, giving a hypodermic injection of morphine sulphate, gr. $\frac{1}{6}$-$\frac{1}{4}$, with scopolamine, gr. $\frac{1}{150}$; another dose of scopolamine, gr. $\frac{1}{250}$ is given forty-five minutes later. After that, scopolamine, gr. $\frac{1}{300}$ is repeated every half to an hour depending on the progress of labor and the severity of the pains. Occasionally, small amounts of ether by the drop method are used to help control an irrational patient or excessive pain. We try to arrange that no hypodermics are given within the hour before delivery. The fetal heart sounds are noted every fifteen minutes.

When the patient is ready for delivery, she is anesthetized with nitrous-oxide oxygen gas, occasionally augmented by ether, administered by an expert anesthetist. She is then placed in the lithotomy position. The parts are washed with green soap and water, followed by alcohol after which they are painted with a 2 per cent iodine solution, followed again by alcohol. The patient is then draped and the bladder is catheterized.

Immediately after the fetal head is delivered, 1 c.c. of pituitrin is injected into the patient's buttock. When the placenta is expelled, 1 c.c. of ergotol is injected into the opposite buttock. This procedure contracts the uterus and decreases the loss of blood. The surgeon then changes gloves, redrapes the patient and carefully examines the cervix for old as well as new lacerations.

Trachelorrhaphy.—To expose the cervix, a Gelpi-Bubis self-retaining perineal retractor is inserted into the vagina and opened. (Figs. 1, 2, 3.) The nurse presses the uterus down from above and the cervix is grasped with two ring-shaped, rubber-covered tenacula. If there are any lacerations present, old or new, the tenacula are readjusted to grasp the edges of the tear, and the cervix is drawn to the opposite side so as to give a better exposure. A flexible or angle-shaped retractor facilitates this. If there is an old, healed laceration present,

Fig. 1.—Gelpi retractor in place.   Fig. 2.—Gelpi-Bubis retractor in position.
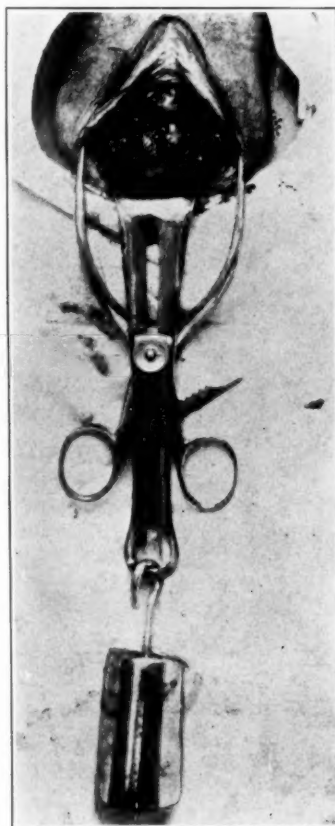
the same technic is used as in the regular trachelorrhaphy operation using enough continuous or interrupted No. 2 chromic catgut sutures to insure complete hemostasis and good coaptation. Allowance for shrinkage of the cervical tissues must be made.

Cystocele.—The anterior vaginal wall is next examined for prolapse or cystocele. This repair is not very difficult and the results are most gratifying. In subsequent pregnancies and deliveries a repaired anterior wall usually causes very little trouble and in most cases was not even visible. The operation consists of making a midline incision

through the vaginal mucosa and underlying fascia, beginning just below the urinary meatus, and continuing down to the cervical junction. The edges are grasped with large Ochsner or curved Kelly hemostats. The flaps are then dissected laterally to the pubic arch by blunt dissection either with the knife handle, finger, or gauze. The bladder is then separated and lifted up from the cervix, care being taken not to leave any pouches in the lateral angles of the wound. The pubovesical fascia on both sides is then brought to the midline by from two to four No. 2 chromic catgut sutures. This

Fig. 3.—Gelpi-Bubis retractor.
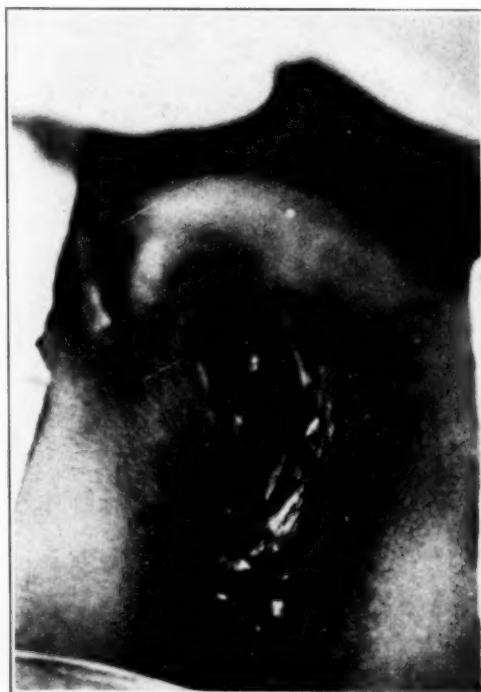
Fig. 4.—Condition of vulvar outlet at end of delivery. No new lacerations.

gives a new and firm base to the urethra and bladder. The excess of vaginal mucous membrane is then cut off and the edges are brought together with a No. 1 chromic continuous, interlocking, catgut suture. The cervix and uterus are then pushed high into the pelvis and a temporary vaginal pack is placed in the vagina.

Rectocele.—The repair of the floor of the perineum, so-called rectocele depends on,

    (a) whether there is a recent or old laceration present,

    (b) whether there is a recent tear superimposed on an old laceration,

    (c) whether the extent of the tear is first, second, or third degree,
    (d) and the direction of the laceration.

The object is to remove scar tissue and to replace the various layers
of the perineal body in their normal relative position. This is accom-
plished by separating the posterior vaginal wall by blunt dissection as
high and as far out along the levator ani muscles as is necessary. A
purse-string suture of No. 2 chromic catgut is then placed around the
hernial opening, if it is not too large, and tied. The perineal body is
built up in layers over this. The excess of vaginal mucous membrane
and scar tissue is removed and the edges are then brought together
by interlocking or interrupted No. 2 chromic sutures. The skin is then

Fig. 5.—Forty-five minutes after delivery.   Fig. 6.—Six weeks after delivery.
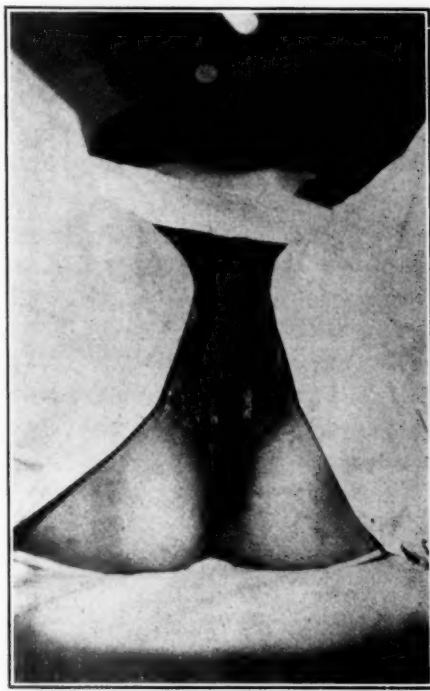
sutured and the temporary vaginal pack is removed. Excessive oozing,
if present, is controlled by a wide iodoform pack, which is removed in
twenty-four to forty-eight hours.

    After placing a sterile sponge over the vaginal opening, the anus is
examined. If there are any edematous or enlarged hemorrhoids pres-
ent, the sphincter ani is thoroughly dilated, and the hemorrhoids are
either incised or removed by knife and sutured, using a fine needle and
No. 1 chromic catgut.

    As soon as the patient regains consciousness, she is returned to her
room and kept warm. Occasionally an infusion of 1000 to 2000 c.c.

of saline solution is given into the subpectoral space, if indicated.

The following case (Figs. 4, 5, 6) is a good example of what can be accomplished in forty-five minutes after delivery:

CASE 2.—Mrs. C. A., age 41, para v., was admitted from the Out-Patient Department on Nov. 15, 1922. Her dispensary record showed the presence of a cystocele, rectocele, old lacerated cervix, and hemorrhoids. Immediately following a normal delivery, a bilateral trachelorrhaphy, anterior colporrhaphy, and secondary perineorrhaphy, and hemorrhoidectomy were done in forty-five minutes. Fig. 4 shows the condition immediately after delivery, Fig. 5 at the completion of the repair, and Fig. 6 six weeks later.

If the gyneplastic operation is done twenty-four or more hours after labor, the following technic is used:

The night before the operation, the patient, if nervous or apprehensive, is given 20 to 30 gr. of sodium bromide or 1 gr. of luminal. One-half hour before being sent to the operating room, she is given a hypodermic injection of 1 c.c. of pituitrin to decrease the lochia. This is followed fifteen minutes later by a hypodermic injection of morphine sulphate, gr. $\frac{1}{4}$, and atropine, gr. $\frac{1}{150}$. Under nitrous-oxide oxygen anesthesia, she is carefully prepared for operation. Great care is taken to wipe the vagina dry without traumatism and swab it and the cervix thoroughly with a 2 per cent iodine or 2 per cent mercurochrome solution, followed by alcohol. The bladder is then catheterized, and the operative procedure is the same as above described.

The postoperative care consists of making the patient as comfortable as possible, alleviating the pain with generous doses of codeine or morphine. A pillow under the knees and frequent changes of position add to the comfort. Occasionally these patients are troubled with urinary retention. The necessity for catheterization is shown in Table V.

TABLE V

NO. TIMES CATHERIZED	0	1	2	3	4	5	5+
NO. OF CASES	107	38	14	3	3	2	2

The various known remedies are first employed and catheterization is used as a last resort followed by daily instillation of 2 oz. of 1:5000 neutral acriflavine solution as first advocated by P. A. Jacobs of the Urologic Department. Urotropin, potassium citrate, or other urinary antiseptics are used when indicated.

The bowel movements are kept soft with $\frac{1}{2}$ to 1 oz. of petrolagar or liquid albolene one or two times a day, with a daily injection of 4 oz. olive oil after the third day in cases where a hemorrhoidectomy was done. Castor oil, aromatic cascara, etc., are used when indicated.

The mother is given the routine diet and the baby nursed according to schedule, missing only one or two regular feedings after the operation.

COMPLICATIONS

The complications that occurred in this series were no different from those which may occur after any gynecologic operation. There were two cases of bronchitis and one of pneumonia during the influenza epidemic. Two patients had slight postoperative hemorrhages which were controlled by vaginal packing. A spurting artery in the perineum had to be tied in another. In one case a marked edema and cellulitis of the vulva and perineum developed causing the sutures to give way. The final result, however, was quite satisfactory. Thrombophlebitis occurred in one with good recovery. Perforation of the rectum by the gloved finger occurred while dissecting the posterior vaginal wall from a large rectocele. A purse-string suture was tied around the opening after inverting the mucous membrane into the rectum. The operation was then completed. A small rectoperineal fistula resulted but closed before the patient left the hospital.

Postoperative fever was caused in a number of cases by congestion of the breasts, cystitis, cystopyelitis, retention of lochia, and constipation.

Every patient left the hospital in a gynecologic condition better than upon entering. Most of them had perfect results. No deaths or permanent disabilities occurred in this series. The end-results are shown in Table VI.

TABLE VI

RESULTS	VERY GOOD	SATIS-FACTORY	SLIGHT RE-LAXATION	IMPROVED	UNHEALED	WORSE
NO. OF CASES	98	42	9	15	5	0

No serious complications due to this operation resulted during subsequent deliveries. Several went through normal childbirth without a tear, and in some an episiotomy followed by repair was done with gratifying results.

SUMMARY

Obstetrics has become a highly developed field of major surgery. While the prenatal care, delivery, and postnatal care have been greatly improved, practically nothing has been done at the time of delivery or lying-in period to remedy old lacerations of the genitalia.

Our experience during the past eight years at Mt. Sinai Hospital, of Cleveland, has refuted the impracticability of operating immediately or shortly after childbirth.

The reasons for operating at this time are:

1. That it is both a prophylactic and curative procedure.

2. That from an economic standpoint, it saves the patients, hospitals, and community many dollars and hospital days.

3. That the patients do not suffer more pain than is usual after the repair of new lacerations.

4. That operative deliveries or the presence of lochia do not seem to interfere with the healing of the tissues.

5. That subsequent deliveries are not complicated by the previous repairs. If a new laceration occurs, either spontaneously or by episiotomy, it is repaired immediately after the delivery.

6. That every patient was greatly benefited by the gyneplastic operation.

Hospital records of the above cases were compiled by S. H. Lesinger, former resident in obstetrics of Mt. Sinai Hospital, Cleveland, Ohio.

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7016 Euclid Avenue.

THE TREATMENT OF SECONDARY ANEMIA BY BLOOD TRANSFUSION PRECEDING OPERATION FOR MYOMA UTERI AND PELVIC INFLAMMATORY DISEASE*

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PART I. BY DR. ANSPACH

SUCCESSFUL pelvic surgery depends, after all, no more on the skilful performance of the details of an operation than on determining just when an operation is needed, what the operative procedure should be, the preparation of the patient for the operation, and the after-treatment that will be required. I desire particularly to draw attention to one of these problems, namely, the preparatory treatment of certain bad operative risks.

There are two stumblingblocks in pelvic surgery that have impressed me with the value of blood transfusion; the first of these is concerned with myoma of the uterus, and the second with pelvic inflammation.

It is not uncommon for a patient suffering with a myoma of the uterus to present herself for treatment with a hemoglobin below 40 per cent, red blood cells numbering less than three million, and exhibiting the cardiac murmurs and palpitation, dyspnea, and other manifestations that form part of the symptomatology of the severer forms of anemia.

*Read at a meeting of the Obstetrical Society of Philadelphia, January 8, 1925.

This condition is the result of hemorrhage alone, or of hemorrhage combined with a toxemia due to degeneration of the tumor or stasis of the urinary or intestinal excretion from pressure. To show the incidence of secondary anemia, Cullen reported that 170 cases were seen at the Johns Hopkins Hospital from 1889 to 1912. Seven were unfit for operation and died without surgical intervention; in 3 the myomatous condition and the anemia were the direct cause of death; in 4 others complications, such as toxic absorption and the like, were present; 13 patients died after operation, the fatal outcome being due to peritonitis, obstruction, circulatory failure, etc. In 150 patients who recovered, the hemoglobin content varied between 10 and 40 per cent. Among the last 100 cases of myoma at the Jefferson Hospital, in 6, the hemoglobin was under 40 per cent; in 9, it was between 40 and 50 per cent; and in 8 cases the red blood cells were under three mil-

TABLE I

COMPARISON OF THE INCIDENCE OF SECONDARY ANEMIA IN MYOMA UTERI AND IN
PELVIC INFLAMMATORY DISEASE

(100 CONSECUTIVE CASES OF EACH)

	MYOMA	PELVIC INFLAMMATORY
Hemoglobin 40 or less	6 cases	1 case
" 50 " "	9 "	5 cases
" 60 " "	8 "	10 "
" 70 " "	10 "	17 "
Lowest hemoglobin	24%	Lowest hemoglobin — 40%
Red blood cell count		
less than 1,500,000	1 case	0
2,500,000	1 case	0
3,000,000	6 cases	2 cases
3,500.000	15 "	8 "
4,000,000	17 "	22 "
Lowest red blood count	1,490,000	Lowest red blood count 2,650,000

lion; of the entire series, 20 per cent had red blood cells under 3,500,000, and hemoglobin less than 60 per cent. The lowest red cell count was 1,490,000, and the lowest hemoglobin estimate was 24 per cent.

Prior to the use of radiation, and before the technic of blood transfusion had been perfected, profoundly anemic patients were serious operative risks. An operation was done only when it appeared that desperate chances to stop the loss of blood must be taken lest the patient succumb. Later on the x-ray proved helpful in some of these cases, and indicated the more effective method of intrauterine radiation.

Radium proved a great addition to the therapeutic resources of the surgeon dealing with chronic uterine hemorrhage, because it is nearly always effectual within a short time, the drain on the patient is checked, the blood picture may be restored to the normal with suitable remedies, and the operative procedure may be carried out with

safety at that time, unless, as occasionally happens, the myoma has so far regressed that no other treatment is required.

If radiation does cure myoma of the uterus, one may ask, why is operation for this condition ever undertaken when the patient is anemic? Although a discussion of the merits of operation as opposed to radiation does not strictly come within the bounds of this paper, I may review the question briefly, in order to show that in some
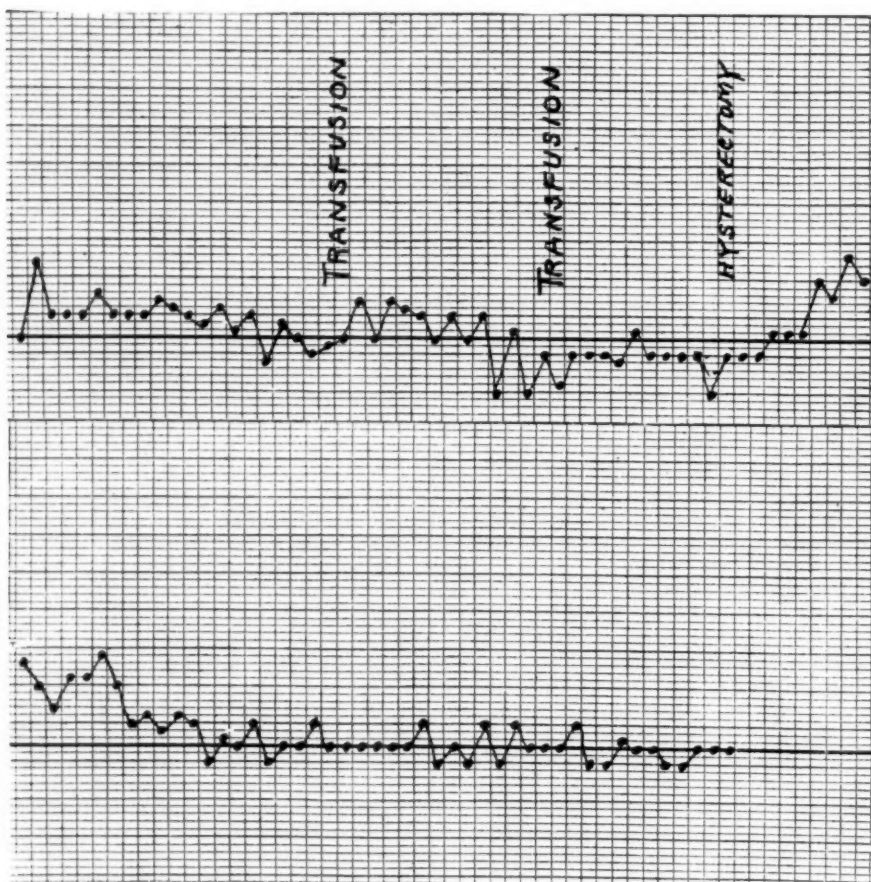
Fig. 1.—Temperature record in a case of myoma with pelvic inflammatory disease in which transfusion was used preparatory to operation.

cases complicated by anemia, operation preceded by blood transfusion is the procedure of choice. In favor of operation it may be stated that, even if radiation does arrest hemorrhage and tend to reduce the size of the tumor, a fragment of the myoma may remain that will eventually serve as a nucleus for further growth; malignant manifestations may be undetected, either in the tumor itself (sarcoma) or in the endometrium (carcinoma); certain complicating intrapelvic

lesions, such as inflamed adnexa and ovarian cysts, may be overlooked
and give rise, either at once or later, to serious disturbances; radiation
may destroy or seriously impair the reproductive functions in young
women; as the shrinkage in myoma induced by radiation is slow, this
method is not the better one when serious pressure symptoms are
present, such as, for example, vesical and ureteral obstruction, with
resulting cystitis and pyelitis, etc.; when the myoma is the seat of
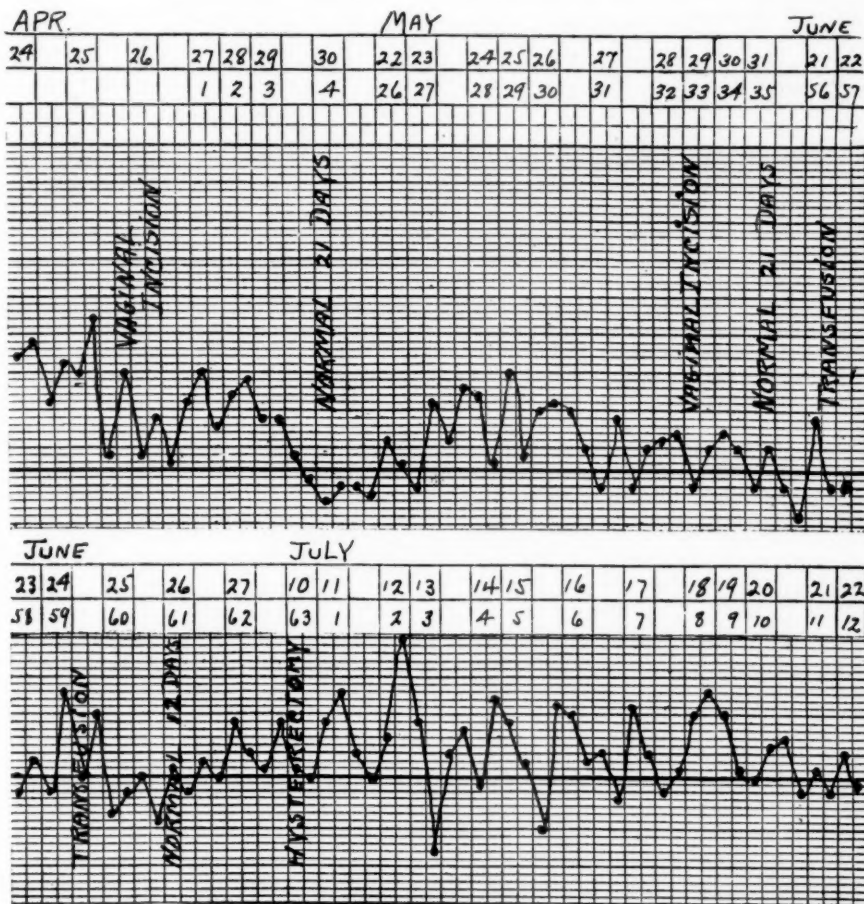
Fig. 2.—Temperature record in a case of repeated pelvic abscess treated first by
vaginal incision and later, after blood transfusion, by a radical operation.

necrosis, radiation, by the traumatism incident to its use, or by a fur-
ther reduction of the blood supply, may aggravate the necrotic
condition.

In favor of radiation it may be said that the operative mortality
from the procedure itself is practically *nil;* no matter how serious the
general condition, radiation for the control of hemorrhage may be
used without hesitation; and if radiation fails, operative measures may

be undertaken later without detriment to the patient. This last is the strongest argument for radiation. No one will deny that if it were possible to remove a myoma with no more risk than is attended by radiation, operation would always be preferable. But aside from the general state of the patient, something must be said as to the morbidity and mortality. Obviously, radiation is not suitable for cases com-
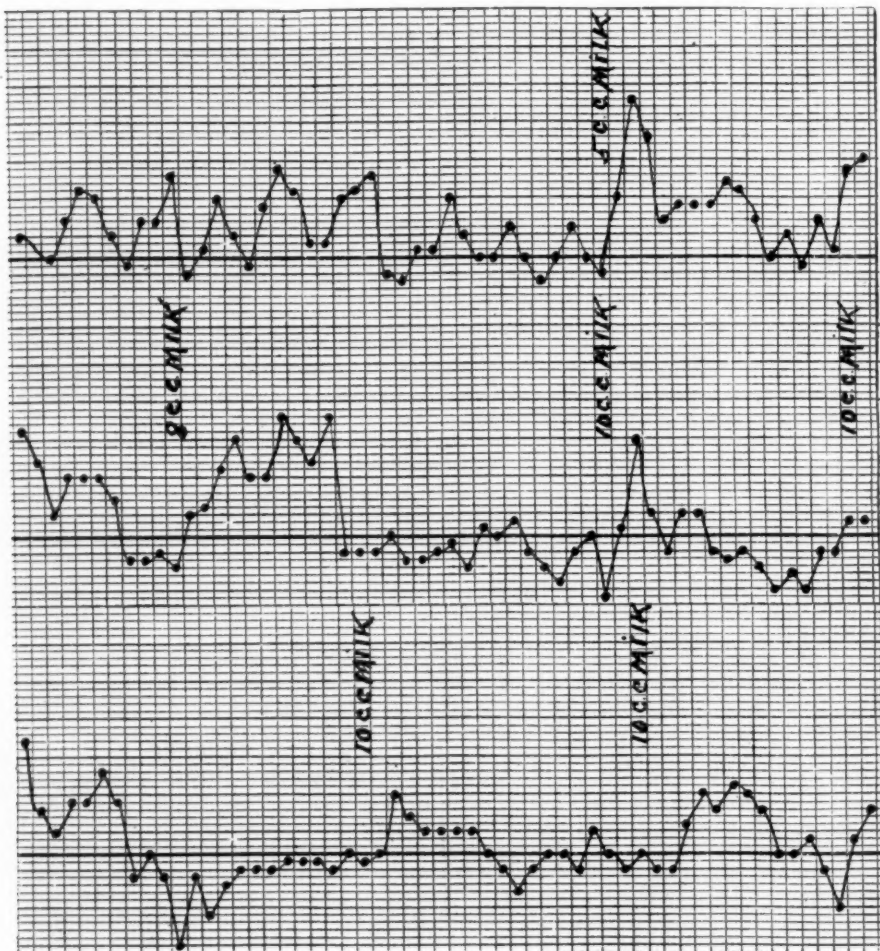
Fig. 3.—Temperature record in persistently febrile case of pelvic inflammatory disease, showing the effect of milk injections. Temperature after last injection remained normal.

plicated with inflammation, degeneration, malignancy, and marked pressure effects, and it is in these cases that the operative morbidity and mortality are highest. In uncomplicated cases the operative mortality is low (less than 1 per cent); the patient is cured permanently, and there is no danger of subsequent growth or degeneration of the shriveled remains taking place.

Unquestionably, then, in a majority of cases, operation is to be preferred to radiation, and the latter should be reserved for those patients in whom the advantages to be gained by operation are overbalanced by the dangers of the treatment.

It seems clear, therefore, that our choice should be radiation, particularly when the preponderating symptom is hemorrhage; especially is this so in intramural tumors, when the uterus is smaller in size than a four months' pregnancy, and all parts of the endometrium may be reached in a diagnostic curettage. Myomata complicated by anemia, organic heart disease, diabetes, chronic nephritis, serious pulmonary disorders, goiter with heart symptoms, and other general lesions that increase the risk of operation, are all indications for the use of radiation.

Operation may confidently be selected when the general condition of the patient is good; when myomectomy is possible without impairing the reproductive functions; when the predominant symptoms are due to pressure; when the uterus is larger than a four months' pregnancy; when the tumors are multiple in number and submucous or subserous in type; when the tumor is degenerating or the growth is complicated by adnexal lesions, and in those cases in which any or all of these factors cannot be excluded.

To return now to a consideration of the cases in which the patient is a bad operative risk because of the anemia alone: Here we must at once admit that radiation should be the treatment selected. If, however, there are risks attendant on the use of radiation due to the rekindling of an old inflammatory disease or necrosis of an already degenerating tumor; if radiation would leave behind a myoma that is suspected of being sarcomatous in nature, or an endometrium so inaccessible to the curette that the presence of carcinoma cannot be excluded; if damaging pressure on the pelvic structures would continue even though the hemorrhage is arrested, or if future conception is greatly desired and a myomectomy appears feasible, in all these cases operation is much to be preferred, provided the patient can be so prepared that the procedure may be carried out with a fair degree of safety. It is under such circumstances that blood transfusion is of great value and serves to change a bad risk to a good one.

Another group of very troublesome cases are those in which pelvic inflammatory disease is marked by continuous fever, but with no symptoms of a massive localization of pus (abscess) or a subsidence of the acute or the subacute manifestations. In the early days of pelvic surgery many acute pelvic lesions were operated upon, but as the experience of surgeons grew, it became obvious that operative procedure had no place in the treatment of these cases during the acute stage. At the present time it is a well-established principle

that pelvic inflammatory disease must be treated with conservative measures until such time as the acute symptoms subside, or until localization in the form of an abscess occurs. As a rule, one of these two things occurs, and then the course for the surgeon to pursue is clear. For example: In ordinary cases of acute gonorrheal salpingitis, treatment by rest in bed and the use of ice, the Fowler position, the avoidance of laxatives, and an absolute liquid diet, will result, after four or five days, in a reduction of temperature to the normal; the pain will be markedly diminished or will disappear, and the patient will have passed the stormy period. After a week or two in bed, if the attack has been an initial one and the evidence of pelvic disturbances has somewhat subsided or disappeared, the patient may be allowed to leave the hospital. If the attack is a recurrent one and the pelvic masses are well defined, an operation may safely be undertaken after a week or two of conservative treatment. It is well to follow the advice of Simpson and refrain from operation until a vigorous pelvic examination does not provoke a recurrence of pain and a rise in temperature.

In cases of mixed infection, particularly those that follow miscarriage or even full-term labor, the symptoms as a rule subside under conservative treatment; that is to say, the temperature falls, the pulse rate returns to normal, and pain disappears; in other words, the inflammatory disease undergoes regression and the patient gets on the road to recovery. At times, in the more severe cases, during the course of a week or ten days the fever becomes remittent, and an abscess forms in some part of the pelvis. Whatever the condition, the indication is plain: In the first, the patient should not be disturbed; in the second, the abscess should be drained by the most convenient route, recovery being simply a matter of time.

The pelvic inflammatory cases to which I wish especially to direct attention are those that do not follow the ordinary course—those in which the fever is protracted, the pelvic masses and exudates do not undergo regression, and an accessible frank abscess that may be opened does not form, nor does the patient reach the stage where an intrapelvic operation may be undertaken without great danger from operative shock, a spread of the infection, or an unfortunate mutilation of the pelvic organs, the latter the more regrettable the younger the patient. The explanation for these protracted cases rests either on the severity of the infection or on a lack of resistance. In either case the general condition of these patients is usually bad or rapidly becomes so. On examination it will very frequently be found that anemia is a marked feature: it is a secondary toxic anemia, due for the most part to the absorption of toxic products from the infected site, but to a certain extent, at least, the result of menorrhagia. Blood

of poor quality handicaps the individual and lowers her resistance to such an extent that the natural antagonistic forces of the body are impaired and she does not possess sufficient strength to overcome the infection. The lowered vitality of the woman may subject her to an especially virulent form of bacterial invasion. In many instances the continuation of symptoms is associated with extensive pelvic exudates that manifest no tendency toward absorption. These exudates may be of considerable size, and with the enlarged and inflamed adnexa, may be palpable above the pelvic brim; or the pelvis itself may be converted into a solid mass, the viscera becoming fixed and embedded in the inflammatory exudate.

The virulence of the infection may be lessened and the patient's resistance may be increased in two ways: First, by the use of foreign proteins, the method recommended by Peterson, and further elaborated by Gellhorn, especially in pelvic surgery; second, by the use of blood transfusion.

The introduction into the body of protein substances, parenterally, was based upon the clinical observation that certain sera (protein substances) believed to be specific were effectual in controlling other infections.

The effect of foreign protein given by intramuscular injections of milk has been observed by Roy Mohler and myself in 12 cases. Foreign poteins in inflammatory cases often render a subsequent operation unnecessary. As a matter of fact, in only two cases of my series was an operation performed subsequently; in the others, the patients felt so well that they refused operation. Peterson and Gellhorn have used the method frequently, having in mind chiefly the avoidance of operation, but I am inclined to believe that as a treatment preparatory to operation, it will have equal value.

In the more rebellious cases of pelvic inflammatory disease associated with anemia, I have used blood transfusion instead of intramuscular injections of milk; it probably acts in two ways; first, by the effect produced by the introduction of a foreign protein, and second, by the fact that the blood is enriched by the actual addition of its important constituents, the red and white blood corpuscles and hemoglobin, and blood formation is stimulated.

It would seem obvious that patients so treated will have more resistance to the infection, and pus will form and become localized (abscess), or resolution of the inflammatory process will be promoted.

PART II.   BY DR. JONES

Method.—We use the Unger whole blood method, which permits the transfusion of undiluted blood without coagulation or injection of air. There are three objections to the citrate method: (1) the blood

platelets are destroyed; (2) a 2 per cent sodium citrate solution given intravenously has produced a fatal result; (3) while sodium citrate is added to the blood to prevent coagulation and its use is, therefore, justifiable, if there is a way of transferring undiluted blood without coagulation and without adding a foreign body to the blood, then that method is obviously the method of choice.

Amount.—In those cases to which the anemia is not due to an acute hemorrhage, we have found it of no value to give larger amounts than 400 to 500 c.c. This comparatively small quantity places less strain on the heart of the patient and permits another use of the same donor at an early interval.

Interval.—We usually wait for four days to elapse between transfusions. This gives enough time for a readjustment of the fluid and cellular equilibrium and enables the donor to make up most if not all of that which he has lost.

Reaction.—Reactions after transfusion with whole blood do occur but not as often as after transfusion with citrated blood. In patients whose blood has been carefully cross agglutinated, we have never seen a serious reaction, with the exception of one patient suffering from the toxemia of pregnancy and in certain cases of acute septicemia.

Effect of Transfusion upon the Blood Elements.—The reaction of the blood elements following blood transfusion differs in the primary and in the secondary anemias. There is an initial rise of from 5 to 10 per cent in hemoglobin and from 300,000 to 500,000 in the number of red cells. This is followed in from three to five days by a subsequent rise which continues to a normal level. In primary anemias, on the other hand, while there is also an initial rise, there follows in from three to five or even seven days, a drop which may continue until the blood count falls to the previous estimation or even below it.

OUTLINE OF CASES OF BLOOD TRANSFUSION IN SECONDARY ANEMIA PRECEDING OPERATION

CASE 1.—B.R., Age thirty.   Myoma uteri.
    Blood: 4/21/23—H. 45; R. 3,810,000.
    Transfusion: 5/ 1/23—400 c.c.; Reaction 2,° No chill.
    Blood: 5/ 2/23—H. 53; R. 3.810,000.
    Blood: 5/ 4/23—H. 60; R. 4,000,000.
    Hysterectomy: 5/ 7/23.

CASE 2.—L.S., Age thirty-two; Myoma uteri.
    Blood: 4/17/23—H. 35; R. 3,000,000.
    Blood: 4/20/23—H. 46; R. 2,840,000.
    D. and C.   4/21/23—Radium—50 mg. 24 hr.
    Transfusion: 5/ 7/23—620 c.c.; 1° rise.
    Blood: 5/ 7/23 After transfusion—H. 58; R^1 3,800,000.
    Blood: 5/ 9/23—H. 60; R. 4,300,000.
    Transfusion: 5/12/23—500 c.c.; 1° rise.
    Hysterectomy: 5/16/23.
    Blood: 5/22/23—H. 62; R. 3,820,000.

CASE 3.—M.C., Age forty-one;   **Myoma** uteri and pelvic inflammatory disease.

Blood:	1/ 7/24—H. 35; R. 2,290,000.
Transfusion:	1/16/24—440 c.c. No reaction.
Blood:	1/17/24—H. 46; R. 3,140,000.
Blood:	1/20/24—H. 48; R. 3,780,000.
Transfusion:	1/23/24—400 c.c. No reaction.
Blood:	1/26/24—H. 63; R. 3,790,000.
Hysterectomy:	1/29/24.

CASE 4.—R., Age thirty-eight;   Myoma uteri.

Blood:	7/15/24—H. 25; R. 2,100,000.
Transfusion:	7/16/24—400 c.c.; No reaction.
Blood:	7/17/24—H. 43; R. 2,850,000.
Transfusion:	7/20/24—400 c.c.; No reaction.
Blood:	7/24/24—H. 65; R. 3,670,000.
Hysterectomy:	7/24/24.

CASE 5.—L.R., Age twenty-six;   Pelvic inflammatory disease.

Blood:	4/24/22—H. 41; R. 3,350,000; W. 23,600.
Vaginal incision:	4/26/22.
Blood:	5/26/22—H. 51; R. 3,780,000; W. 11,600.
Vaginal incision:	5/29/22.
Transfusion:	6/21/22—500 c.c.
Blood:	6/23/22—H. 47; R. 3,810,000.
Transfusion:	6/24/22—550 c.c.
Blood:	7/ 8/22—H. 70; R. 4,020,000; W. 10,900.
Hysterectomy:	7/10/22.

CASE 6.—B.W., Age forty-two;   Pelvic inflammatory disease—myoma uteri.

Blood:	3/18/22—H. 70; R. 3,100,000; W. 6,600.
Blood:	5/16/22—H. 50; R. 2,780,000.
Blood:	5/22/22—H. 45; R. 3,020,000; W. 13,000.
Transfusion:	5/27/22—1,000 c.c.
Blood:	5/29/22—H. 56; R. 4,220,000; W. 9,400.
Blood:	6/10/22—H. 52; R. 4,130,000; W. 12,800.
Blood:	9/ 1/22—H. 80; R. 4,500,000; W. 6,400.

Vaginal incision and drainage
Suprapubic incision and drainage } 9/4/22.

1827 SPRUCE STREET.
1426 SPRUCE STREET.

INFLUENCING THE FERTILITY OF THE FEMALE WHITE RAT BY TREATMENTS WITH PLACENTAL TISSUE

PRELIMINARY COMMUNICATION

BY FRANCIS KOVACS, M.D., BALTIMORE, MD.

(From the Obstetrical Department of the Johns Hopkins Hospital and University, Baltimore)

IT would be a great boon to humanity if it were possible in certain cases to prevent conception or to retard the further development of the fertilized ovum. With the exception of uncertain and unesthetic contraceptive procedures, the only method which we have to date for utilization in such cases is operative. This is always dangerous and its effects cannot be reversed. Moreover, on account of our defective knowledge as to its dosage, x-ray treatment is scarcely available for this purpose. Consequently, it would be extraordinarily helpful if we could find a method based on biologic principles which would bring about temporary sterility of the female, unattended by the risks of operative procedures and without the unpleasant symptoms which follow castration.

During the last few years, considerable attention has been devoted to this possibility of the production of sterilization in the female by the use of spermatoxins (Taylor, Landsteiner, Dunbar, Dittler, Guyer, Savini, Venema, and Cartney), but the results obtained have been neither uniform nor convincing. Most of the authors have based their conclusions upon only a few experiments, so that the results obtained have not been uniform, while the experimental methods employed are open to criticism.

There is, however, another biologic mode of approach which we believe is worthy of consideration. According to Abderhalden, certain protective ferments, syncytiolysins, are constantly arising in the blood stream of the pregnant female, which are able to digest and destroy the fetal cells which have access to the circulation. According to Schmorl, such antiferments are produced by the entrance of chorionic cells into the maternal circulation, where they act as foreign protein. The supposition of such parenteral antiferment reaction has been confirmed by the findings of Waldstein and Eckler, who report that in rabbits, a distinct Abderhalden reaction of the testicular protein may be demonstrated shortly after coitus. That some very important alteration of the organism occurs, just at the time the chorionic villi begin to proliferate and to invade the maternal tissue,—a process which affords abundant opportunity for the trans-

mission of chorionic cells and cell groups entering the maternal blood stream—is abundantly indicated by the frequent occurrence of pernicious vomiting at this stage of pregnancy (about the sixth week).

Generally speaking, it may be said that the duration of life not only extrauterine but particularly intrauterine, depends in the first place upon the vitality of the germ-cell. In the former, certain organisms live to the extreme limits of their possibility, while others succumb earlier as the result of constant struggle with their environment at various stages of their development. Similar conditions continue to affect the existence of the ovum in intrauterine life, and it may be safely said that most of the spontaneous and formerly unexplainable abortions occur at the time when the first critical conflict begins between the invading fetal tissue and the defensive forces of the maternal organism. In such a conflict, those ova must perish which possess a lowered vitality and resistance. According to our conception, it is not a matter of great importance whether the specific tissue elements just mentioned gain access to the organism by growing into the maternal blood vessels, as occurs normally during pregnancy, or whether they are introduced artificially by parenteral injection (subcutaneous, intramuscular, or intravenous injections). Consequently, it may be supposed that if we repeatedly introduce parenterally, into the maternal organism, cell elements derived from the chorion, we shall subject the animal to active and powerful immunizing influences with specific placental tissue. Such a procedure after a time results in such a reaction that the organism is enabled to destroy by means of the protective ferments, thus produced, whatever chorionic elements may have gained access to the circulation. It seems safe to assume that if a female, treated in this way, becomes pregnant the development of the fertilized egg will be more and more checked from the time of its nidation, and that the process will be accelerated with the growth of the chorionic elements. In such cases, it seems probable that the pregnancy will be interrupted in its early stages, on account of the interference with the development of the villi, and that interruption may occur in the case of eggs which have much greater vitality than is commonly met with in the cases which result in spontaneous abortion. In this event, it would appear that the vitality of the egg has been relatively diminished by increasing the resistance of the antagonistic maternal organism.

We have found nothing in the literature dealing with this idea; although Adler stated that he had found that the injection of an extract of the mammary gland removed immediately after delivery, may suspend the possibility of conception in another animal or even cause early abortion. Moreover, Hippel and Pagenstecher were able to produce abortion in pregnant guinea pigs by the administration of cholin injections. Hofbauer reported a similar effect due to the

degenerative changes in the placenta by feeding pregnant guinea pigs with cholesterin. Bleibtreu also reports that he has been able to diminish fertility by the use of thyroid extracts, and Haberlandt in certain cases produced temporary sterility by the subcutaneous transplantation into the normal female of ovaries removed from pregnant animals. On the other hand, placental opton has been proposed as a remedy for sterility associated with hypoplasia of the uterus by Puppel, who claims to have effected a cure in one instance and his observation has been confirmed by Pock, who has reported two similar cures.

In the experimental study undertaken in the hope of solving the problem just propounded, we have chosen the albino rat for our breeding experiments for several reasons. In the first place, it needs only limited space, little attention, and is relatively cheap. Moreover, its morphology and biology have been worked out in every detail in great part by American writers (Long, Evans, Bishop, Huber, Kirkheim and Burr). Furthermore, it is additionally suited to our purpose for the reason that it has great fecundity, an estrus cycle of about five days, and that the female begins to breed when she is seventy to one hundred days old, while the duration of pregnancy is twenty-two and that of lactation twenty-one days. Moreover the animal breeds at any season of the year and coitus is followed by pregnancy in 80 per cent of the cases. In our experiments, we treated a number of adult female rats, varying from four to twelve months of age, by eight or ten injections of freshly prepared rat placental tissue at intervals of from two to five days. The individual dose varied from 0.5 to 1.5 cm., or a total of 10 cm. during the entire period of treatment (twenty-five to thirty days). In our first series of observations, the female was kept continually with the male rat from the time the injections were begun; while in the second and third series, they were mated only on the ninth day after beginning the injections, so that they had received four injections prior to the possibility of their becoming pregnant. After this first mating, the male and female rats were kept together permanently. The male rats, which we employed, were adult animals between five and fifteen months of age, which had shown distinct signs of sexual activity. The injections were made subcutaneously into the lower abdominal wall with the usual aseptic precautions. At first we attempted to give them intraperitoneally, but, on account of the difficulty of controlling the animals, the bowels were sometimes injured so that we lost three rats from peritonitis. Unfortunately this animal is not suitable for intravenous injection and, furthermore, the placental extract which we employed is not suitable for that form of administration. In our experiments, we have used only placental extracts pre-

pared from placentae of white rats, as it seemed rational to suppose that a higher specificity of biologic reaction would be obtained in that way than if placentas of other animals were employed. Unfortunately, this resulted in considerable technical difficulties, as the rat, like most rodents, eats its placenta immediately after delivery, so that it cannot be collected after normal labor. Consequently the only way of obtaining the placenta, if we do not wish to kill the animal, is by operative means. It is possible to diagnosticate pregnancy in the rat at about the sixteenth day, and shortly thereafter we obtained the placentae by means of cesarean section. The bicornate uterus of the pregnant rat usually contains seven to eight young, and it is easy after making two or three small openings in the uterine wall to express the entire product of conception, and then to close the wounds by suture. The only objection to this method is the time it consumes and the necessity of maintaining a rather large supply of rats, in order to be able to obtain sufficient fresh placental tissue for our injections.

As we are completely ignorant concerning the cellular or chemical component, or components, of the placenta, which are concerned in bringing about the supposed biologic reaction, we made no attempt to prepare our extracts by complicated physical or chemical procedures, in the hope that by avoiding such drastic procedures the important unknown components would escape destruction or removal. For this reason, we prepared our placental extract, as follows: After removing the membranes, the umbilical cord and the larger vessels, the placenta was cut up on a sterilized board into as small pieces as possible by means of a sterile razor. The material obtained was then ground in a sterile mortar with 5 cm. of physiologic salt solution and eventually a homogeneous pulp was obtained, which we injected directly with a record syringe. In order to preserve the placental extract, we added a few drops of chloroform which kept it permanently sterile. I should however, emphasize that we in no case used extracts which had been kept for more than three or four days. In this way we believe that we have not only retained all of the effective components of the placenta, but have excluded the possible production of autolytic and autooxidation products. This is particularly important, as the latter process is able to change the character of lipoids to such an extent that those formerly insoluble in water may become soluble, and at the same time lose the solubility in ether, chloroform, benzol, and similar solvents.

For purposes of control, we used a series of rats injected with fresh testicular tissue prepared by the same technic as the placental extract, and finally we followed a series without injections of any kind.

The accompanying Table I shows the results obtained in twenty-six breeding tests.

TABLE I

TYPE OF TREATMENT GIVEN THE FEMALE RATS.	TOTAL NUMBER OF ANIMALS.	NO. OF ANIMALS BECOMING PREGNANT AND DELIVERED AT TERM.	NO. OF DAYS BETWEEN MATING AND BIRTH OF LITTERS.			AVERAGE NO. OF YOUNG TO EACH LITTER.
			Min.	Max.	Average	
Injected with extract of rat placenta*	16†	7=43%	22	68	38½	8.2
Control: No injection	5	4=80%				
Control: Injected with extract of rat testis	6	6=100% } =99%	22	30	23.5	8.

*Duration of the observation since the mating of the 6 rats rendered sterile=85 days.

†One rat died nonpregnant on the twelfth day after mating, and two died on the twenty-ninth day after having been continually together with the male. Autopsy showed no signs of pregnancy and that death had resulted from peritonitis caused by injury to the bowels during the injections. In three other cases small subcutaneous abscesses developed at the site of injection but had no serious consequences. No other complications followed the injections.

Table I clearly indicates that the injection of placental extract has a decided influence upon the fertility of white rats. This is indicated not only by the number of animals which were rendered sterile (56.3 per cent) but also by the subsequent occurrence of pregnancy in animals which did not become pregnant, in other words, fertility was retarded. On the other hand, the control animals which were not treated at all, as well as those injected with testicular extract, all became pregnant within a week after being placed with the male, except one of the control animals, which remained permanently sterile for some unknown reason. Two of the specifically treated rats became pregnant on the first day of mating, and in this event, the treatment which was started on the same day could not be expected to have had any effect. On the other hand, the other rats became pregnant on the tenth, fifteenth, twenty-first, twenty-second, and forty-sixth days after having been permanently kept with the male and in the last one, the pregnancy occurred twenty-three days after termination of the treatment, which apparently indicates that the protective influence of the injections had become exhausted. The three rats which died during the treatment had not become pregnant and died on the twelfth, twenty-second, and twenty-ninth days respectively. Six rats remained permanently unfertile during the entire time of our experiments, namely, eighty-five days after mating and fifty-seven days after the completion of the course of treatment.

That neither repeated trauma nor other untoward circumstances connected with the injections, nor the unspecific influence on the body of strange protein introduced parenterally into the organism, had any-

thing to do with the production of the unfertility, is strikingly proved by the control series of six rats which were treated with rat testes extract with exactly the same technic. All of these became pregnant without exception within six days after being put with the male. In this connection, it is interesting to note that McCartney reports that the subcutaneous injection of the nonspecific organism-extract does not cause sterility. On the other hand, we have noted that a considerable fraction of the treated animals do not become pregnant for a long time after the completion of the treatment.

Upon analyzing the results obtained, we feel inclined to believe that the retardation in the occurrence of pregnancy or the actual sterility might be only apparent. It is quite possible that conception may occur as frequently in the treated as in the control animal, but as the result of the presence of the protective ferments, only those ova, which are endowed with exceptionally high vitality, are able to develop successfully in the presence of the defensive reaction of the maternal organism, while the rest of the fertilized eggs, which possess only the average vitality, undergo degeneration at an early period of development.

Attention should be directed to a fallacy connected with the above experiments, namely, that the females were mated simultaneously with the beginning of the treatment. This was due to our original belief that the supposed action of the syncytiolytic antiferment was directed against the chorionic villi; but the duration of pregnancy in the rat is so short that it is possible that nidation of the fertilized egg may already have occurred long before the organism has produced a sufficient quantity of antiferments to hinder the development of the placenta.

In order to eliminate this fallacy, we conducted a second series of experiments in which the animals were not mated until nine days after beginning the injections, as various serologic tests show that the antibodies which bring about immunity usually appear six or eight days after the application of the antigen.

Table II shows the results obtained under these conditions and indicates that none of the rats of A series, and only one of the B series, treated before mating, became pregnant during the period of observation.

In order to ascertain whether the biologic result which we obtained is produced specifically by the placenta from the same race of animal, or whether it is due to special substances of a chemical character present in the placentae of any race of animals, we made a series of injections with an extract prepared from human placental tissue. Of the four animals treated in this way, one did become pregnant in the relatively short time available for observation, and the results apparently justify the conclusion that the placental tissue of a foreign

TABLE II

TYPE OF TREATMENT GIVEN THE FEMALE RATS.	NO. OF TREATED ANIMALS.	BEGINNING OF THE TREATMENT.	NO. OF INJECTIONS BEFORE MATING.	BEGINNING MATING.	FINISHING THE TREATMENT.	TOTAL NO. OF INJECTIONS.	NO. OF ANIMALS BECOMING PREGNANT.	DURATION OF OUR OBSERVATION IN DAYS:	
								Since mating	Since finishing of treatment
Injected with rat placenta;									
A, series	5	9.I	4	17.I	7.II	10	0	73	52
B, series	10	10.II	4	21.II	17.III	10	1	38	14
Injected with human placenta	4	25.II	4	6.III	23.III	8	1	8	8

race has probably not the same protective effect on the maternal organism against pregnancy as that of its own race.

In an attempt to determine the mechanism of this reaction, we have examined the blood of the treated animals in the hope of being able to detect the presence of a protective ferment. For this purpose, we used the blood of a rat which was killed after the eighth injection and that of a rabbit (obtained from the ear vein) which we had previously treated with injections of rat placenta. The tests were made according to modified technic for the Abderhalden reaction, described in "Fermentforschung," 1922, vol. v, 163. The following combinations were studied:

1. Rat serum from animal treated with rat-placental extract, plus rat-placental tissue;
2. Rabbit serum from animal treated with rat-placental extract, plus rat-placental tissue;
3. Control rat serum nontreated with placental extract, plus rat-placental tissue;
4. Rabbit serum from animal treated with rat-placental extract, plus liver tissue;
5. Rabbit serum from animal treated with rat-placental extract plus human placental tissue;
6. Rabbit serum from animal treated with rat-placental extract.

The results were negative, as we were unable to observe any significant difference between the tests and the controls as described by Abderhalden.

Furthermore, it is impossible to state whether the effect of our treatment was due to an actual failure of conception or to abortion of the fertilized egg in an early stage of development. It should be remembered that abortion does not occur in the lower animals as in women, by the elimination of the dead ovum, but that the defective ovum is resorbed *in situ* after its death. Even if it were passed as in woman, the animal would eat the aborted mass immediately after its expulsion, and thus its passage would almost certainly escape detection. However this may be, we observed distinct bleeding from the vagina in two instances, which might probably have resulted from an abortion. Furthermore, the general behavior, as well as the sexual life, of the treated rats did not differ from that of the nontreated animal. Nor were we able to note any sign of anaphylaxis which is in agreement with the statements by Dittler and Cartney. When the animals finally become fertile, as shown in Table I, the number of young in a litter is not influenced by the preceding treatment, which averages between seven or eight being born.

As we are completely in the dark concerning the biologic significance of this reaction, we are obliged in attempting to explain our findings and results, to take into consideration the possibility of some endo-

crine hormonal function of the placenta, as well as the possibility that the injections of the placental extract may exert some influence on the ovarian function. During the past few years, considerable work has been done concerning the internal secretion of the placenta. Guggisberg has proved that its expressed juice apparently produces contractions of the uterine muscle, while Wintz by a complicated process obtained a lipoid-like substance from the placenta which causes hyperemia of the genitalia and results in enlargement of the uterus and of the mammary glands. He also showed that the substance shortens the coagulation time of the blood and diminishes its viscosity. Kratzeisen, Martin and Puppel have confirmed Wintz' observations. Moreover, the observations of Fellner and Herman indicate that the placenta contains certain hormone-like substances which have approximately the same effect as those of the corpus luteum. Halban believes that the placental hormone checks the occurrence of ovulation and Novak has arrived at the same conclusion from a theoretical basis. After the conclusion of our experimental study, we became acquainted with the publication of Haberlandt, in which he claims that he has shown experimentally that the placental hormone brings about cessation of the ovulation just as does that of the corpus luteum of pregnancy. For this purpose he used the placenta-opton prepared by Merck of Darmstadt; but as far as I can see from the report of his experiments performed upon two rabbits the results should not be considered as convincing.

As the result of our work, we feel that it would be premature to take a definite stand in favor of any particular one of the many possible explanations for the experimental findings. We seem, however, to have established the fact that some important biologic change follows the parenteral introduction of fresh placental tissue into the female which results in a temporary checking of fertility. Further research must be done on larger animals, in whom the duration of pregnancy is longer, in order to determine whether the infertility observed is the result of an early abortion followed by the resorption of the product of conception, or whether it is due to an alteration of the ovarian function, which results in inhibition of the maturation of the follicles, or gives rise to ova of less than the average vitality. Finally, it would be highly important to be able to isolate the component of the placenta which produces the relative infertility, and particularly to make such results available for use in human beings.

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VERSION, ITS INDICATIONS AND CONTRAINDICATIONS*

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THEORETICALLY parturition is a normal, physiologic function; practically it is seldom that. Even when it proceeds naturally and spontaneous delivery occurs, it is likely to be pathogenic or productive of disease and disability, and all too frequently it is pathologic as well, complicated by actual disease or by mechanical conditions which give rise to the various dystocias. For this reason many methods of operative delivery have developed as the science of obstetrics has improved and none of them has a more definite, if limited field of usefulness, than the procedure technically known as version.

It is impossible to discuss the subject of version without bringing up the name of its greatest modern exponent, Potter of Buffalo, who is responsible for its recent general recrudescence. His teaching is undoubtedly dangerous, especially if it is to be given the general application for which he pleads. Labor may have become a pathologic affair in a large majority of instances but it is decidedly not yet at the point where every delivery must be converted into an operative procedure and a major surgical one at that. Moreover, his maternal results may be excellent but his latest reported fetal mortality of 6.73 per cent does not commend the method for universal adoption unless, in order to lessen the mother's pain and to shorten the time which the obstetrician must devote to each case, we are willing to see a decided increase in our general fetal mortality. I can easily see, however, how appealing Potter's arguments must seem, particularly to

those who have observed him operate; his dexterity and facility make the procedure a very tempting one and we are prone to forget that in the hands of the average practitioner and even in the hands of the skilled obstetrician who is not quite so facile in that particular procedure, the results may not be quite so good. However, he deserves the credit for bringing to our attention an obstetric procedure which had fallen into rather general disuse and for widening considerably the indications for its employment. Since I have studied his methods I am using version in many instances where previously I should have been tempted to apply high forceps or even to perform cesarean section, and I am getting uniformly good results. But again I would make the point that the natural mechanism of labor has never been excelled by any operative methods which have been devised to supplant it, and that if a spontaneous termination of labor seems at all possible, there is no valid excuse for any interference and particularly for interference so radical and dangerous as version.

Cephalic version as employed for the conversion of a breech into a vertex presentation in the last month or two of pregnancy, in my experience is a trying and unsatisfactory procedure. It cannot be done at all unless the abdominal walls are thin, a sufficient quantity of liquor amnii is present, and the presenting part is not deeply engaged. Anesthesia is usually necessary and even with the gentlest manipulations there is grave danger of precipitating premature labor and a definite though remote chance of interfering with the placental attachment and causing a premature separation with its attendant risks to mother and child. Moreover, even when the maneuver has been successfully executed, there is always the strong possibility that unless immediate engagement of the head occurs, which is not probable, the child will return to its old position. The handling of the average breech case at the time of labor is so simple and fraught with so little danger to mother or child that I can see no place for cephalic version, which is not a means of delivery but simply an uncertain and rather unsafe introduction to a labor which may prove to be even more complicated by vertex presentation than it would have been by breech. I am aware that at intervals enthusiastic reports have appeared on prophylactic external version, but my results by breech delivery have been too satisfactory for me to be willing to consider substituting for it an admittedly uncertain method of which the results are no better than those I am already achieving by letting nature handle the case.

There are certain general indications for podalic version which admit of no special argument. In selected cases of placenta previa, after dilatation has been completed or has progressed to the point where it can safely be completed manually, version by the Braxton-

Hicks method is the ideal treatment; the breech acts as a plug to check the hemorrhage and labor is allowed to continue naturally. It is also an ideal treatment for certain cases of accidental hemorrhage, although under those circumstances it must be followed by immediate extraction. Again, in prolapse of the cord or of an extremity, when dilatation is complete and rapid delivery is essential if the child is to be saved, version followed by extraction gives better results and is decidedly less radical than the other methods usually advocated for the handling of this condition. In transverse and oblique presentations natural delivery is, of course, impossible and an elective version ordinarily gives excellent results.

I believe that version should be utilized more frequently than it is at present as a method of terminating long and tedious labors where the presentation is vertex and where because of slight degrees of disproportion or because of ineffective pains the progress has been slow and unsatisfactory. This is particularly true in the various malpresentations of the head such as occipitoposterior, face, brow, chin and parietal bone presentations. Such malpresentations frequently result in the most trying type of labors. The pains are hard and frequent and complete dilatation usually occurs, but the head remains persistently high or else, even with marked degrees of molding, makes little or no progress through the birth canal. Natural delivery may eventually occur but such babies invariably show the effects of continued compression. Autopsy shows that brain injuries are common and, if they do survive, mental disability is rather frequent later. The labor must, therefore, be terminated as promptly as possible and in as conservative a manner as possible if many of these babies are to be saved. If the head is still floating or has descended so slightly that the high application of forceps would be necessary, then to my mind version is decidedly the procedure of choice, for I can see no field in operative obstetrics for this dangerous and thoroughly unsatisfactory operation. Moreover, Sir James Y. Simpson long ago pointed out that the head molds more readily, with less chance of internal injury, if the delivery is accomplished from the base, so to speak, and that in mild degrees of pelvic contraction the head adapts itself to the birth canal much more readily if the presentation is not vertex. If the head has descended far enough to permit of a medium application of forceps, I make a tentative application, but if gentle, firm traction produces no results, I resort to version immediately without further attempts, assuming that no serious disproportion exists. If it does, cesarean section should have been done at or before the onset of labor as an elective measure; and in neglected cases or in the presence of infection, craniotomy has a useful though, of course, a strictly limited field.

Certain conditions are essential for the performance of version. Where serious disproportion exists, version should never be attempted; deep tears are certain to result and rupture of the uterus is a grave possibility. Again, version should never be attempted unless the cervix is either completely dilated or so nearly so that dilatation may safely be completed manually. The only exception to this rule is in placenta previa, where immediate extraction need not follow. If this point is not very carefully observed, tears and even rupture of the uterus are likely to follow and the child will certainly be lost. A tetanic contraction of the uterus, of course, contraindicates version, as does the formation of Bandl's ring with retraction of the ring high up on the fundus and a marked thinning of the lower segment; the possibilities of rupture in such a case are so serious that other methods of delivery must be considered.

Another point usually stressed in textbooks in the discussion of version is that the membranes must either be intact or very recently ruptured if the procedure is to be considered. I am not in accord with this view. In such malpresentations as those for which I am advocating a more frequent use of version, early rupture of the membranes and dry labors are of rather frequent occurrence, and it is my custom, if a tentative application of forceps does not succeed, to anesthetize the patient at once and proceed to do a version. I regard the absence of severe disproportion and of tetanic contraction, and the presence of a completely dilated or easily dilatable cervix, as of very much more importance in the consideration of version than the time at which the membranes happen to have ruptured. I can recall offhand some 12 or 15 cases of vertex malpresentations or slight degrees of disproportion in which I have done version after a trial labor, many hours after the rupture of the membranes, when rapid delivery of the baby was essential, and my results for both mother and child have been uniformly good.

Deep surgical anesthesia is essential, so that all reflex, psychic, and voluntary muscle activity is eliminated. Many times I have done successful versions after the membranes had been ruptured for many hours and when the uterus seemed almost in a state of tetanic contraction because deep anesthesia gave such perfect relaxation that the procedure was relatively simple. I have had no experience with ethylene but nitrous oxide oxygen anesthesia is highly unsatisfactory under the circumstances and I no longer use anything but ether. I might say in this connection that I was particularly interested in one of the papers read at the November meeting of the Southern Medical Association by Dr. Rucker of Richmond, advocating the use of adrenalin to secure relaxation of a tetanically contracted uterus prelim-

inary to version. I have not yet had the opportunity of trying out the method but it seems a reasonable and safe one.

In all breech deliveries and particularly in primiparae, I do a fairly extensive episiotomy. Tears are likely to occur no matter how carefully the operation is done and repair is easier after episiotomy than after an uncontrolled laceration. A thorough knowledge of the position of the child is essential before any attempt at version is made, and speed is at no time of importance. The breathing of the mother is of great assistance in turning the fetus, provided slow and gentle traction is made on the foot after it is grasped. If the feet lie to the right of the mother, the left hand is introduced, and if they lie to the left, the right hand is used. I do not consider it a matter of importance which foot is grasped first as rotating the back anteriorly is easily done after the foot is brought down and before engagement of the breech has taken place. Grasping both feet is of advantage if it can be done without difficulty, otherwise they are brought down one at a time.

When the umbilicus appears at the vulva the most trying part of the procedure is at hand. It is generally believed that the maximum limit of time for the extraction of the baby after the appearance of the umbilicus is eight minutes, and because at such times each minute seems an hour, the temptation is strong to work fast and forcibly and terminate the delivery at once. Nothing could be worse for either mother or child, and a clock in plain view might be an excellent thing for the obstetrician's peace of mind, for ordinarily, if the cervix is fully dilated, as it should be before version is undertaken, he has time and to spare though it seems otherwise. Working quietly, slowly, and deliberately will hasten the delivery considerably more than hurried attempts at extraction at this stage. As soon as the umbilicus appears, it is a wise plan to pull down several inches of the cord to prevent its compression between the head and the brim of the pelvis. Then with gentle traction the body is forced down until the shoulders appear at the outlet. Here another mistake is frequently made in forcing the hand into the vagina, which is already filled to its limit, in an endeavor to extract the arms. Grasping the baby by its feet and swinging the body laterally upward over the mother's abdomen will usually cause a spontaneous and voluntary delivery of the posterior shoulder, when the maneuver should be reversed for the delivery of the anterior shoulder.

The head is delivered by the Mauriceau-Smellie-Veit maneuver. As soon as the version is complete the assistant, with the palm of his hand, follows the fundus downward with firm pressure as the baby descends, in order to avoid disturbance of the normal flexion of the head or extension of the arms up beside the head or even behind the

occiput.   After the head is engaged in the superior strait and the Mauriceau-Smellie-Veit maneuver is begun, he makes firm pressure with his fist in the direction of the plane of the pelvis at the superior strait.

While I advocate a wider use of version in conditions in which it is not very generally employed, namely, vertex malpresentations and labors in which rupture of the membranes has occurred some time before operative delivery is indicated, I have by no means advocated its promiscuous use.   Moreover, I have been conservative rather than radical in my championship of this method, for in many of these cases the way out has formerly been either high forceps or cesarean section late in labor, both of which are admittedly attended with definite risks and with an inevitable mortality and morbidity.   I would say again that where spontaneous delivery seems likely and safe, it is the only logical termination and any interference is meddlesome and unjustifiable, but in those cases in which operative delivery is necessary in the interests of either mother or child, version has a wider field than is at present accorded it, and I believe will give results very much better than many of the other more radical obstetric procedures.

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SYMPTOMS ASSOCIATED WITH THE MENSTRUAL CYCLE AND THE EFFECTS THEREON OF OVARIAN THERAPY*

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WE desire in this communication to detail the clinical features and course in a group of 132 women who complained among other symptoms of hot and cold "flashes" and who received as therapy desiccated whole ovary. We elsewhere[1] outlined the theoretical considerations underlying the proper dehydration of gonadal tissue and therein affirmed that the desiccated whole ovary was a specific remedy for the "flashes" of the menopause and that the effects upon the "flash" symptom afforded an index to the value of the ovarian preparation employed. It is to tissue so desiccated that we here refer.

All the women who came under our immediate care and who con-

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stitute the source of the observations reported upon were referred to us for treatment after it was decided in each of them that no pelvic pathology or remediable anomaly was present to account for the symptoms. A review of the pelvic findings in these cases reveals the fact that though conditions relative to the pelvic floor, cervix, and position of the fundus uteri cover almost the whole gamut of clinical possibilities, neoplasms excepted, in only three cases are findings recorded as indicating pathologic lesions in the adnexa. It would appear from this that all the individual examiners who furnished us with cases had agreed without conspiring that diseased adnexa, at least, no matter what the symptoms, were not for the investigator in endocrine therapeusis.

We found that women with ''flashes'' belong to one of three subgroups. The women in our gynecologic clinic who had ''flashes'' or hot and cold flushes were (1) those in the menopause, (2) those in whom the symptom occurred periodically about the time of their menses and (3) those in whom the symptom was not conditioned upon either of these circumstances.

In group one, patients in the menopause, are contained only women who came into the menopause naturally. There were 83 cases in all, distributed as to age as follows: under thirty years, 11; under forty, 18; under fifty, 32; over fifty, 22. The characteristic symptoms for the patients of this group are (ignoring those related to the character of the menses): (a) ''flashes,'' (b) vertigo, (c) ''nervousness,'' and (d) weakness. Most of the patients could add to this list of four, but much of what they might add could be properly listed under one of the above headings and much would be of a nature that was genuinely distinctive and peculiar to the individual patient. The ''flashes'' are sudden feelings of heat and cold. Usually a suffusion of the face, neck and upper chest accompanies the hot ''flash,'' with blanching and sweating in these areas accompanying the cold ''flash.'' These ''flashes'' may happen every few minutes during the day and night, interfering with sleep; or they may occur not oftener than once a day or even as seldom as once a week.

The vertigo or dizziness seems neither distinctly subjective nor objective. Many patients describe merely a sensation of light or heavy headedness. Some are positive that the giddiness comes on with sudden changes in the position of the head, as in stooping forward or changing from a reclining to a sitting position; nevertheless, we could find in these vertiginous attacks no feature of differential value.

Our patients felt physically and mentally ''nervous.'' Their physical complaints were of trembling and palpitation of the heart. They showed tremors of the hands or facial muscles, or at times coarse

shaking of the limbs; and these motor agitations were usually most manifest when the "nervousness" set in. As a rule tachycardia was not present in the patients of this group nor did we often meet with the so-called pseudoangina of the menopause (precordial pain with or without radiation to the left arm).

Anxiety, fear, and irritability dominate the mental picture. Of this triad, irritability is outstanding and shows itself most often in "crying spells."

The weakness is subjective. The patients feel weak and lack the initiative to exert their strength in the face of this feeling. In truth, many simply voice the end-result of their symptoms in this avowal of weakness. At any rate, whatever the mechanism, the weakness is real in the sense that the patient is an ineffective. With all this the general nutrition of such patients is excellent. Indeed, a majority of them complain of a too rapid gain in weight.

Capsules of approximately five grains of desiccated whole ovary were administered three times daily to all of these patients. After one week about 80 per cent of the patients reported a diminution in number of attacks of "flashes" and some relief from the annoying vertigo. At the end of a month most of the patients were completely free of "flashes" and vertigo; those in whom relief was not complete were very much helped in that the "flashes" were considerably fewer in number and less in intensity. The continued use of the ovarian substance completely dissipated the "flashes" in all.

Not until the "flashes" were diminishing in number and intensity were the patients ready to report further satisfaction with their condition. It was then that they began to "feel stronger." This "feeling stronger" was, as far as we could make out, more the expression of increased satisfaction with themselves than the report of evidences of renewed vigor. Lastly, our patients became less "nervous." Time and circumstance did not permit a detailed study of the manner in which the nervousness expended itself. It was, however, the last symptom to disappear. In nearly all cases the "flashes" were subdued after one month's therapy but more than half the patients entered the second month of treatment still complaining of some degree of "nervousness." However, the continued use of the ovarian substance increased their tranquillity and with it the number of those who acknowledged themselves relieved.

For the last six months, which covers a period not included in this report, we administered to the menopause cases two grains of ovarian substance three times daily. Our failure to bring on the favorable changes as rapidly and as consistently as above indicated for this group, as following a five grain dosage, obviously leads to the infer-

ence that 15 grains a day is well-nigh a minimal dose for patients coming into the distress of the natural menopause.

The second group, that in which the "flash" symptom occurred about the time of menstruation, belong in that large class of sufferers with dysmenorrhea. Our series has 24 in this group, distributed as to age as follows: under thirty-five, 21; under forty, 2; age forty-two, 1. The "flash" symptom with these patients is of negligible significance. The usual set of complaints in order of their frequency and importance is: (a) abdominal pain and backache, (b) nausea with or without vomiting, (c) headache, (d) dizziness, and (e) "nervousness." The first three of these five symptoms, we will observe, are not given as characteristic of the menopausal group, although nausea and headache are not rare features of climacteric symptomatology. But in emphasizing the correlative forces behind dysmenorrhea and the climacteric, it is important to insist upon the qualitative differences in symptomatology as they present themselves. In reference to the abdominal pains it is to be noted that they are not related to the nausea, nor is the nausea associated with epigastric pain. Furthermore, the ingestion of food influences this nausea nowise. The headaches are usually frontal, localized between the eyes, with no tendency to radiate. The vertigo may be characterized and qualified in essentially the same manner as indicated for that symptom of the climacteric. The "nervousness" was chiefly a matter of irritability or its antipode, depression, but being of such short duration gave little concern to most of the sufferers. This whole symptom complex usually spontaneously clears up with the onset or passing of the menses, depending upon the exact time relationship of its occurrence to the first day of menstruation. Our practice in the treatment of these cases was to anticipate the dysmenorrhea for five days with the exhibition of 5 grain capsules of desiccated whole ovary three times daily. Our results may be summarized as follows: the patients as a group were dissatisfied with the results and in that sense the therapy was a failure. Analysis of the circumstances underlying the dissatisfaction disclosed the fact that (1) the abdominal pains were least often relieved and that this was the most distressing of the symptoms, and (2) knowing as they did that without treatment of any kind the whole discomfort was a matter of a few days to a week at most, they regarded successful, therapy such as would keep them free of discomfort of any kind for the entire period of menstruation.

However, upon close questioning, the reports of these patients indicated very decidedly that the therapy relieved or at least mitigated the dizziness, nausea, and headache. Those in whom ovarian therapy was entirely satisfactory were among the most grateful patients we encountered. The relief in them was immediate and complete and we

are satisfied that in no case of dysmenorrhea should ovarian therapy be neglected before passing on to other methods of procedures.

The last group is of especial interest in that it represents a class with menstrual symptoms not associated with the menstrual cycle. All of the patients were under forty years of age. More exactly the age distribution of the 25 cases in this group was: under twenty, 4; under thirty, 10; under forty, 11. The cardinal symptoms of this group are: (a) nausea, (b) vertigo, (c) nervousness, and (d) weakness. The nausea is in no way related to the ingestion of food. These women are entirely free of abdominal or epigastric pain or tenderness. Though many complain of poor appetite, none appear undernourished. The vertigo presents no distinctive characteristic but is much like what has been described for the dizziness of the menopause. The "nervousness," however, differs from that of the climacteric in one essential, namely, that the palpation of the heart is accompanied by tachycardia (rate 90 to 100). In the psychic content of their "nervousness" these women have the identical picture of the menopause. While these women avowed the presence of "flashes" at quite regular intervals, these were of no concern to the patients; in no way bound up with the symptom complex complained of, and, in consequence, not rightly an essential part of the symptomatology of the group. We believe, without commenting upon the justification for it, that the women of this group would, by many observers, be regarded as suffering from hyperthyroidism. Indeed, one patient had a goiter of moderate size. Whole ovarian therapy, five grains three times daily, gave gratifying results with these women. The symptomatology, though in some of many months standing, would clear up in less than a month.

Important for a complete presentation of the natural history of these disturbances under the influence of whole ovarian substance would be a detailed knowledge of the status that ensued in our patients after withdrawal of the therapy. Unless aided by an effective and elaborate follow-up agency, it is impossible to secure these data in any sense systematic or complete. In lieu of such adequate records we might mention clinical experiences that are suggestive of the history we seek.

Repeatedly, women in our menopause group after absenting themselves from the clinic for varying periods of time, returned for further treatment, saying that some or all of their symptoms had returned. Considering this experience in the light of histories of menopausal distress of ten or more years standing, we are led to the thought that in some women, at least, the menopause syndrome is a true deficiency disease calling for continued therapy. Undoubtedly, the forces for spontaneous adjustment to the upset of the menopause shows all degrees of effectiveness from an apparent zero value to one of supreme

effectiveness; and hidden in this fact is the wellspring of doubt and confusion as to the value of endocrine therapy for this condition. Those women whom we relieved of dysmenorrhea showed no desire to test the effects of withdrawal, nor were we anxious to urge the experiment upon them.

The group whose symptoms suggested a relationship to a thyroid dysfunction apparently received permanent relief after an adequate course of therapy. At any rate, within a period of one and one-half years none of these patients returned to us with a story of a recurrence of symptoms.

DISCUSSION

We administered desiccated whole ovary to every woman with "flashes" (*Hitzwallungen*) whether or not they complained chiefly of them, having satisfied ourselves in advance that desiccated whole ovary could be relied upon to alleviate this symptom. We have just outlined three classes of patients that came under our notice and the results of ovarian therapy in each. Without being carried away by the usual enthusiasm of the organotherapist, we can summarize our results as having been eminently satisfactory.

We are well aware of the reports of other observers of these disorders who were quite as thoroughly pleased with the effects of other remedies. It is of paramount importance that we realize that the clinical disorders herein discussed are susceptible of spontaneous cure and that such cures become the inalienable heritage of every system of therapy. Nevertheless, criteria exist for the proper evaluation of any therapy in conditions such as these. Effective therapy should be followed by a percentage of cures that indisputably establish the value of the therapeutic agent. The interval between the beginning of the treatment and the appearance of relief should be reasonably comparable in all cases, even in those showing considerable differences in the duration of the disorder. Furthermore, there should be evidenced a distinct relationship between dosage and effect; and a subtherapeutic dose ought readily to be demonstrated. Demonstrations and occurrences such as these permit of a reasonable certainty that relief after therapy is not simply coincidental. Judged by these criteria, whole ovarian substance in the clinical disorders we have discussed is an effective therapeutic agent.

The pathologic physiology behind the molimina associated with the menstrual cycle cannot as yet be clearly presented. In the common acceptance of the term the clinical conditions we are here concerned with may be called neuroses. Many observers insist upon a psychogenic etiology in neurosis. If psychic factors played an etiologic rôle in our cases, we thoroughly ignored them from the point of view of therapy; and ignoring a set of factors is precisely the procedure by

which to arrive at the manner and incidence of spontaneous cures, if the cures are dependent upon changes in those factors. A cataloging of what in fact was a record of spontaneous cures would not satisfy the criteria as indicated above. The secondary importance of psychotherapy in the neurosis of the menopause has strongly impressed us. That it has no more prominent place in the therapy of neurosis, in general, we cannot presume to say. However, we are much inclined to feel that the status of neurosis is, in prospect at least, as Freud[2] indicated fifteen years ago. "We can hardly avoid perceiving these processes in the so-called actual neuroses the somatic effects of disturbances in the sexual metabolism, while in the psychoneurosis we recognize besides the psychic effects of the same disturbances. The resemblance of the neuroses to the manifestations of intoxication and abstinence following certain alkaloids and to Basedow's and Addison's diseases, should no more be described as 'nervous diseases,' so will the genuine 'neuroses' soon have to be removed from this class despite their nomenclature."

We may with profit consider our reported experience from the point of view of the possible effects of ovarian substance on the vegetative nervous system. The conceptions vagotonia and sympatheticotonia introduced by Eppinger and Hess,[3] while very enlightening, can be made to carry too large a burden, especially where the attempt is made to force all persons into one or the other category. However, our present efforts to study constitutions, predispositions, and diatheses have been genuinely aided by these conceptions. Thorough appreciation of the mechanism of clinical disorders must take into consideration not only the precipitating causes but as well the nature of the soil in which they produce untoward effects. Aschner[4] quotes Novak as placing the women with dysmenorrhea in the vagotonic group and indicates the investigations of Christofoletti as pointing to a heightened irritability of the sympathetic in those with the severest symptoms of the menopause. Appreciating the limitations to be placed on all such generalizations, we may point out that our observations lend themselves to an interpretation in keeping with the assertions of Novak and Christofoletti. We conclude from the following that whole ovarian substance is a stimulant of the extended vagus; (1) it has a tendency to slow the heart rate, (2) it stimulates peristalsis in some giving relief from costiveness, and (3) it has in some women been productive of vesicle irritation. Furthermore, the much greater therapeutic success with this therapy in the climacteric than in dysmenorrhea falls well in line with expectation, provided we allow that in the former condition a vagotonic chemical is demanded and in the latter, a vagus paralytic. Indeed, atropine for dysmenorrhea has been with some a favored remedy.

We may with a good deal of assurance accept the judgment that the clinical disorders herein discussed are founded on a vasomotor instability. We are aware from endless numbers of observations of the serious consequences from sudden changes in the size of the vascular bed. The recent studies of capillary circulation have brought us closer to a sound knowledge of the manner of tissue function and of the reactivity of terminal capillaries to circulating stimulants.[5] The gonads, in a sense supreme in the hierarchy of organs, are serving a function of no mean order in operating as stabilizers of the vascular tree.

While we may readily appreciate the rationale of ovarian therapy for disorders following oöphorectomy or its equivalent and acquiesce in the judgment that such disturbances are of the nature of ovarian deficiency, we must with caution be led into the belief that all disturbances that may be relieved on the exhibition of ovarian substance are predicated on ovarian hypofunction. Insight into the manner in which endocrine therapy operates physiologically will tend, in all probability, to bring us to view these drugs more from the pharmacologic than the humoral coign of vantage. This, too, will render more understandable the efficacy of wholly dissimilar remedies for like disorders.

SUMMARY

The "flash" symptom in women may serve as a guide to the therapy in clinical conditions generally recognized as neuroses. We have indicated three quite similar symptom complexes linked by this common denominator; and after a study of the effects of the administration of desiccated whole ovary upon these conditions have been most favorably impressed with the value of this therapy.

We gratefully acknowledge the kindness of Lehn and Fink, Inc., of New York City, in freely supplying us with the endocrine material for this study.

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THE RÔLE OF THE CERVIX IN STERILITY*

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DURING the past decade, our diagnostic armamentarium for establishing the etiology of female sterility has been enhanced by the admission of transuterine tubal insufflation. With this relatively new diagnostic as well as therapeutic procedure, our attention has been especially directed to the fallopian tubes, and other pelvic conditions have been given second place in their etiologic importance. As a therapeutic measure, tubal insufflation has been hailed as the treatment *par excellence* for female sterility. As a diagnostic measure, it is only outrivaled by the Wassermann reaction. In view of the conditions hereafter described, I feel that transuterine tubal insufflation should only be resorted to after all other diagnostic measures have been exhausted, and the cervix itself and its secretion studied macroscopically and microscopically. I am of the opinion that the cervix itself is of far more importance than the fallopian tubes in the causation of female sterility. The conditions responsible for such sterility may be divided into two classes: (1) alterations in cervical secretion induced by causes hereafter mentioned and (2) structural and anatomic changes, either congenital or acquired.

Normal cervical secretion is small in amount, crystal clear, and has the appearance and consistency of the white of an egg. It is alkaline, viscid, tenacious, and fills the entire cervical canal. This closes the cervical canal and so prevents the invasion of the uterine cavity by ascending bacteria. Under the microscope, there is an occasional leucocyte, but no bacteria whatever. This secretion is normally increased after coitus, and sometimes the excess amounts to a "postcoital flow." It is never increased normally to such an extent that spermatozoa are unable to pass beyond it. This normal cervical secretion may be altered in amount, consistency, and reaction.

Before attempting any treatment for cervical conditions, it has been my routine procedure to submit to microscopic study a twenty-four hour specimen of cervical secretion. This is obtained as follows:

A rosebud tampon especially prepared for this purpose is inserted in the vagina and around the cervix, and is permitted to stay in situ for twenty-four hours. It is then removed and examined. This tampon will have collected all the secretion from the cervix during the interval.

The examination consists of the following:

    Tests of acidity and alkalinity.

    Cloudiness or transparency.

    Consistency and other physical properties.

It is then submitted to the microscope and the following elements looked for.

1. Epithelial cells,—the number and their variety.

2. Leucocytes,—the number and their variety.

3. Bacteria,—the number and their variety.

4. Other structural elements.

After a search of this kind, one can determine more definitely of what the secretion consists, and this information serves as a useful guide in determining its cause. Normal cervical secretion in many cases may become altered by hyperemia or low grade inflammation confined to the cervical mucosa itself or extending deeply into the tissues. This secretion becomes an etiologic factor in sterility when it is sufficient to result in a constant blocking of the cervical canal, and when it is no longer a secretion but an inflammatory or hyperemic product from the cervical glands. Such a condition is commonly called cervical catarrh. In this continuous low grade inflammation of the cervix (and I do not refer to the stage of chronic endocervicitis with hypertrophy and cyst formation) the pathologic secretion is emptied into the cervical canal in such quantity as to impede the passage of the spermatozoa. If these spermatozoa are actively virile and motile, they may penetrate, but if of the weaker variety, they succumb to the acid inflammatory products poured from these cervical glands. Since Reynolds has proved that only vigorous spermatozoa can penetrate the normal mucous barrier of a normal cervix, how much more difficult then for the less vigorous, especially in the presence of abnormal cervical secretion. It is evident, therefore, that for conception to occur, the cervical canal must be freed of this abnormal secretion, and the normal secretion reestablished. In these low grade inflammatory or hyperemic states, the secretion is acid, thick, stringy, opalescent, tenacious, and either green or yellow depending upon the causative factor. Were it acid alone, it would be sufficient to stay the onslaught of the spermatozoa and with changes in its physical properties, their viability and penetrability is certainly diminished or completely eradicated. Cervical secretion may become profuse in amount even when normal in quality.

It has been proved that the secretion of the cervix may be altered chemically by disturbances in ovarian function. It is an established fact that ovarian activity has a marked influence on the endometrium, and there is no reason to doubt that this chemical influence from the ovary includes the endocervical mucous membrane. In many cases of sterility, favorable results have been obtained from feeding patients thyroid and ovarian extract, and these results have been attributed to the favorable effect of these extracts upon the cervical secretion.

Let us now consider some of the common local causes that are responsible for abnormalities in the cervix and its secretions. The most common are:

1. Excessive coitus.
2. Douching.
3. Postgonorrheal conditions.
4. The use of intracervical pessaries.
5. Trauma following elective curettage for the cure of sterility.
6. Anatomic disorders of the cervix usually congenital.

1. It is a well-known fact that excessive coitus produces a chronic passive congestion of all the female generative organs. This passive hyperemia manifests itself in a congested cervix with altered secretions. The proper regulation of coitus usually overcomes this condition.

2. I consider the douche habit in nulliparous women as a very common cause of acquired sterility. The average woman begins douching shortly after matrimony because she considers it one of her marital duties, and when asked why she indulges in this procedure, usually answers, "for cleanliness." She has been advised by some friend or neighbor, probably married a little longer than she, that this is one of the duties of wedded life, and she follows this advice accordingly. In many of these cases there is no necessity for douching, as careful inquiry reveals no leucorrhea or other indications. When this habit has been practiced for a variable period of time (six months to three years) the cervix undergoes a change caused by chronic chemical irritation, and in addition, there is often repeated trauma from the douche nozzle. The average woman does not know how to douche, what with, and when. In cases where the chronic douche habit has extended over a period of a year or more, stoppage of the douche very often results in the establishment of a leucorrhea. If we can obtain the patient's consent to stop douching for a few months, this leucorrhea will cease, and the structures involved will return to normal. Our advice to these young women should be given shortly after matrimony before the douche habit has become an accessory to the tooth brush and other toilet duties. I have often marveled at the tolerance of the cervix and vagina, to the strength of the various douching agents used.

3. Postgonorrheal conditions. This commonly includes glandular endocervicitis. It is found long after the acute gonorrheal process has subsided and is supposed to have been cured. These patients usually complain of a yellowish discharge. It is usually cervical in origin. This discharge is irritating, and so produces erosion of the cervix, sometimes to the extent of eversion of the mucosa. A patient with sterility giving a history of a yellow leucorrheal discharge, espe-

cially worse before a menstrual period should be submitted to the following routine procedure.

1. Inspection of the urethra and both vulvovaginal glands.
2. Examination for chronic bilateral salpingitis.
3. Complement-fixation test.
4. Examination of the discharge.

The absence of gonococci is no proof that the discharge is not gonorrheal, because in the chronic stage, the gonococci have temporarily disappeared from the discharge and lie hidden in the deeper tissues, only to be renewed in their activity by future pelvic congestion caused by sexual intercourse, menstruation, etc. If the cervical discharge contains diplococci found in the pus cells and decolorized by Gram's method, I consider this strong evidence that the lesion is gonorrheal, although other writers prefer to call this pseudogonorrheal. There are a few exceptions to this rule. With such microscopic and physical findings combined with a careful clinical history elicited from the husband and wife personally interviewed, doubtful cases will prove to be cases of latent gonorrhea. Another observation that I might add is that a chronic inflammation of the cervix when due to the gonococcus is more resistant to treatment than when due to other causes. Depending upon the length of time the process has existed, speculum examination may reveal any of the following: an enlarged chronically congested cervix; erosion of the cervix; eversion of the mucosa with enlargement of the external os; hyperplasia of the mucosa to the extent of the formation of mucous polypi; or obstruction of the gland ducts with the formation of retention cysts (palpated as hard nodules and often erroneously diagnosed as cancer).

4. Numerous cervical pessaries have been devised for the relief of sterility. I have never relied upon these metallic agents for the establishment of fertility. I consider these pessaries as an absolute cause for serious pelvic inflammation as well as acute and chronic endocervicitis. Even in cases of dysmenorrhea their usefulness is inferior to that of the negative pole of the galvanic current using 15 milliamperes of current once or twice a week for from five to ten minutes. This is gradually increased after a few treatments, if no result is obtained, to from 30 to 50 milliamperes. Cases of dysmenorrhea treated by pessaries may eventually become cases of sterility because of the cervical and pelvic inflammation they produce.

5. In a paper recently read on "Use and Abuse of Curettage," I called attention to the deleterious effects of curettage for the relief of primary sterility. These range from laceration of the cervix to atrophic endometritis. I am convinced that curettage of the cervix or body of the uterus has absolutely no place in the treatment of primary sterility and holds forth nothing for the sterile patient.

6. Anatomic and structural disorders. Let us for a moment consider the structural peculiarities of the cervix which differentiate it from the fundus uteri: It has no peritoneal covering over the greater part; its muscular layer contains more connective tissue and so makes the cervix firmer. There are no large venous sinuses in the cervix. The mucous membrane lining of the cervix is thrown into prominent folds which extend obliquely outward from the anterior and posterior lip. These glands are racemose with branching ducts and dilated ends and are lined with columnar epithelium. The cells secrete mucous which does not take the eosin and hematoxylin stain. The cells lying next to the lumen appear clear as these are usually filled with mucous. The secretion of the cervix has been previously described. Ducts of the mucous glands may become obstructed, thus causing retention cysts commonly called ovulae nabothae. If many of these are similarly affected, the condition becomes one of cystic degeneration of the cervix. The cervical mucosa has no part in the menstrual cycle or pregnancy except in rare cases. We can, therefore, readily see that this difference in the structure of the cervix will under pathologic conditions show different pathologic changes.

The commonest variety is what is known as the pinhole os. A minute opening of the cervical canal does not mean absolute sterility, but the subnormal diameter of the cervical canal permits it to be more readily obstructed by cervical secretion. The most minute os is many times larger than the uterine opening of the fallopian tube through which spermatozoa readily pass, and it is only when this pinhole os becomes blocked with mucous, either normal or pathologic, that it may be a cause of sterility. In such cases, I am inclined to operate on the external os by enlarging it by two lateral incisions and uniting them in the opposite direction. Another common condition is a small cervix with a small external os accompanied by an anteflexion. This results in inadequate drainage. The cervical secretion is much thicker and more tenacious than the normal, and microscopically is found to contain a larger number of leucocytes. Chronic congestion may alter this secretion so that it may be increased in amount, and even may be altered physically so that it resembles mucopus as a result of a secondary infection. Such infections are not venereal, and usually secondary to congestion. Venereal infections differ from the foregoing because the cervical discharge is frank pus and is more liable to spread to the ovaries and uterus.

The next common type of cervix met with is the conical cervix which is a true infantile type of cervix. It is short, lobulated, and more quadrangular than conical. The lateral fornices as well as the anterior and posterior are relatively shallow. The rôle of this type of cervix in sterility has been overestimated and numerous operations devised with the idea of overcoming the inadequate portio vaginalis.

The real difficulty in these cases is a retarded development of the uterus, tubes, and sometimes ovaries, as well as the cervix. Very often added to this is an obstruction higher up in the genital canal. I have seen pregnancy repeatedly occur in these cases of conical cervix where no surgical measures had been instituted, and where general tonic and endocrine treatment were followed out.

Stenosis of the Cervix (Stricture or Synechia).—This condition has been held responsible for sterility, because of an obstruction to the favorable entrance of the spermatozoa. I feel that the successful passage of a 2 mm. sound through the cervical canal is sufficient evidence that the spermatozoa may pass. However, if there is present associated pathology as endocervicitis, the secretion is altered, resulting in an inspissated plug of mucous or mucopus. This plug not only acts as a mechanical bar to the invading spermatozoa, but is also a chemical antagonist to their motility.

Erosions of the Cervix.—When found in nulliparous women, they have their etiology in ovarian dysfunction. I refer to congenital erosions. There is usually concomitant menstrual disorder. The menses are infrequent and protracted. The secretion of these eroded glands is pathologic. These erosions may also be the result of an old gonorrheal condition in childhood or a nongonorrheal endocervicitis in puberty. The condition is rather rare, but should not be overlooked in our search for etiologic factors.

CONCLUSIONS

1. The cervix in sterility is more often of primary etiologic importance than the fallopian tubes.

2. Many obscure cases can be cleared up by detailed study of the cervix and its secretions.

3. This study should be resorted to before employing tubal insufflation.

4. In structural disorders of the cervix, such as pinhole os, conical cervix, etc., surgery is rarely indicated, but more attention should be directed to the altered secretion accompanying these conditions.

801 WEST END AVENUE.

THE LIMITATIONS OF CESAREAN SECTION*

By C. Jeff Miller, M.D., F.A.C.S., New Orleans, La.

CESAREAN section has evolved from a procedure which was primarily designed to rescue a living child immediately after the death of the mother, into a comparatively safe operation when performed by competent surgeons in suitable surroundings and in properly selected cases. At one time the mortality was so high that it was practically never resorted to except in the most desperate cases—we are all familiar with the century of fatalities reported in Paris prior to 1876. Today the pendulum has swung so far to the other extreme that some surgeons apparently believe that there is no other solution of a complicated labor. It is true that uniformly good results have been reported in large series of cases, that the technic of the operation is simple, and that at first glance it seems to offer a rapid and safe way out of every difficulty. But it is these very facts which have combined to give the operation a popularity which men trained in the science of obstetrics cannot but view with grave misgivings.

I am not decrying the operation when it is performed in properly selected cases, upon indications which have been evolved by years of experience and study, but I do believe that widespread abuse of the operation is prevalent today and it is for that reason I am presenting the subject to you again.

The scope of any surgical procedure usually extends as the technic is simplified and the mortality is reduced. This has been the natural result in the instance of cesarean section and perhaps explains why at present the operation is so often considered a mere matter of surgical technic and is so frequently performed without regard to the fundamental principles of obstetrics upon which every delivery should be based. Technically it should be as safe as any simple abdominal operation, though I would remind you that even the simplest of abdominal operations carries an inevitable and perfectly definite minimum risk. The average mortality is estimated at 2 per cent, though such men as Bar, Schauta, Reynolds, Kerr and Hirst have reported large series of cases, in one instance 128, without a single fatality. But statistics gathered from the hospitals throughout the country show that the mortality is rarely less than 10 per cent and frequently is very much higher. In Massachusetts in 1921 cesarean section ranked as a cause of death among parturient women only second to puerperal septicemia, and Massachusetts does not lack competent surgeons. It is evident, therefore, that perfection of technic is by no means the

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only or indeed the most important factor in the reduction of the mortality.

Careful study of the statistics will show that the mortality has been reduced only in properly selected cases and that the excellent results reported by such authorities as I have just quoted are due not so much to their soundness of technic as to their soundness of judgment. When the operation is an elective one, done at the appointed time just before or just after the onset of labor, and done for definite obstetric indications, then the results in the hands of competent men are beyond reproach. But when, as is too often the case, it is an emergency procedure done in neglected labors by occasional operators, the mortality promptly reaches a figure which places it among the most serious of abdominal operations. In the exhaustive study of 1591 cases undertaken by Kerr and Holland a few years ago it was definitely proved that the risk increases hourly after the onset of labor, reaches 10 per cent when the second stage is well established, approaches 25 per cent when it is performed upon exhausted or infected women, and runs even higher when other methods of delivery, as forceps or version, have been attempted previously. Routh had shown in an earlier review that the mortality was markedly influenced in cases in which the membranes had ruptured prior to operation. The importance of these conclusions is apparent when we recollect that cesarean section too often presents itself as an emergency, as an apparently easy solution of a difficult problem, usually when the patient is in the second stage of labor and very frequently after she has been infected by previous injudicious management. Under these circumstances it carries with it a potential mortality sufficiently high to warrant an earnest consideration of other means of delivery before it is resorted to.

There are other important factors to be considered in addition to the inevitable risk of operation. It is usually performed in young women who will in all probability conceive again, and the question of their subsequent pregnancies is one that cannot be ignored. I am by no means an advocate of the facile dictum, "Once a cesarean always a cesarean," but I do believe that rupture of the uterine scar is a sufficiently grave possibility to make the question of subsequent pregnancies a serious one. Reliable statistics show that rupture of the uterus occurs in about 4 per cent of all subsequent pregnancies and that this accident is peculiarly likely to occur after a febrile convalescence, which is the case, even in well regulated hospital services, in some 50 per cent of all cesarean operations. If it is agreed that no woman whose convalescence after an abdominal delivery is not normal should be allowed to attempt a future spontaneous delivery of a full-term child, and many authorities agree that no other course is safe, it will be obvious that a second cesarean must be done for this

reason in a large majority of cases. Moreover, no patient, no matter how normal her convalescence, is safe in a future pregnancy unless she is delivered in a hospital within reach of a competent surgeon. It is evident, therefore, that many young women, particularly those living in remote country districts, must be put to great inconvenience and expense in each subsequent pregnancy to secure the safeguards to which they are entitled, a fact which in itself should urge the conscientious obstetrician to be very sure of his indications for abdominal delivery.

These indications have not been established by mere theory or chance. They have been gradually evolved by painstaking observation and by collective studies of large series of cases managed by different procedures. They are necessarily and rightfully elastic, but the present tendency seems to be to sweep them all away and to base the indication for the operation largely on the patient's chances of surviving a major surgical procedure. Such indications as primary uterine inertia, asthma, epilepsy, arthritis, varicose veins, easily corrected malpresentations, and equally trivial complications, naturally lead to the conclusion that operative zeal has replaced scientific knowledge and judgment.

Even in a contracted pelvis, the most definite indication for cesarean section, the operation is frequently abused. Since pelvimetry has become a recognized part of the practice of obstetrics we are realizing that varying degrees of pelvic contraction are relatively frequent, but just what percentage of them will disturb the normal mechanism of labor is a problem not yet solved. Williams, Schauta and other authorities of equal standing have proved that from 75 to 80 per cent of all pelvic contractions will deliver spontaneously if properly managed, with an almost negligible maternal and fetal mortality. But at present with the rank and file of the profession the main indication for the cesarean operation seems to be the existence of a contraction, regardless of the degree. Differentiation of the degree and type of disproportion before the onset of labor is essential, for the abuse of the operation for this indication lies not only in its indiscriminate performance for all degrees of contraction but also in the time at which it is performed. The possibility of complications should be considered before the onset of labor, not when the patient is exhausted after a long and ineffective second stage, or when she has been infected by previous attempts at delivery. A case which has been allowed to proceed until high forceps is apparently the only solution is proof of an error of judgment, for even cesarean section on infected women carries no higher maternal and fetal mortality.

Pubiotomy has been urged enthusiastically by a few competent authorities, notably Williams, but it has not received general approval

and personally I do not think that it solves the problem of the neglected case. It is under such circumstances that I believe craniotomy to be justified. A mutilating operation on a living child is always repugnant, but cesarean section upon an exhausted and infected woman for the sake of a child who is already in danger because of a tedious and prolonged labor should be equally repugnant in view of the grave maternal risk. There should never be occasion to perform craniotomy in marked cases of contraction, as elective cesarean section is the only logical procedure, but in borderline and neglected cases, when labor has progressed until there is no safe retreat, the ultimate results must be considered and the useful if limited field of craniotomy recognized.

Extraperitoneal section has somewhat reduced the mortality in such cases but the results are not what had been hoped for, and the largest collective study available, 611 cases, gives a mortality of 4.4 per cent. Whether the low extraperitoneal technic will solve the difficulties remains to be seen. It is beginning to be believed that it predisposes to more frequent rupture of the scar in subsequent pregnancies but the facts are by no means yet established.

In frankly infected cases, if cesarean section seems inevitable, hysterectomy also is probably the safest procedure, but the moral question involved cannot be ignored, and certainly it is a frightful price for a young woman to pay on the chance that she may develop an infection. All observations point to the necessity of clear-cut indications in contracted pelvis: definite recognition of the degree of disproportion before the onset of labor; elective cesarean section in cases of marked contraction; a test of labor conducted under the strictest aseptic precautions, with a resort to abdominal delivery before it is too late; above all, a consideration of other methods of delivery, even craniotomy, in cases advanced in the second stage, particularly when the amniotic fluid has been dribbling away for hours.

During the last twenty years cesarean section has grown in popularity in the management of placenta previa, largely owing to the unsatisfactory results of other procedures. The mortality from the profession at large, owing to delay in treatment or radical attempts at delivery, runs as high as 35 per cent, but in skilled hands and in properly equipped hospitals, when the condition is diagnosed and treatment instituted without delay, the death rate is as low as 3 or 4 per cent. In my own service at Charity Hospital by the use of version, bags and puncture of the membranes, combined with the strictest asepsis, we have obtained uniformly good results, even in cases sent in after repeated hemorrhages or injudicious management before admission. The fetal mortality will never be markedly reduced because the majority of the children are premature and die either

before or just after delivery, therefore abdominal delivery is unwarranted on their account, and because of the high percentage of infection in placenta previa it is certainly unwarranted on the mother's account in the great majority of cases, particularly in view of the good results reported by other methods, which have never been approached by the most earnest advocates of cesarean section. Its occasional performance is undoubtedly justified, particularly in primiparae with rigid cervices at or near term, when infection is definitely absent, but as the routine adoption of the procedure could not decrease the fetal mortality and would probably materially increase the maternal death rate, it should certainly be reserved for the exceptional case which meets the conditions I have outlined.

In premature separation of the placenta the emergency is rather different. When severe hemorrhage is present and the patient presents toxic symptoms as well, cesarean section is often indicated, particularly in view of the alarming postpartum hemorrhage which often follows the emptying of the uterus and which not infrequently involves the entire uterine muscle and may even occur into the abdominal cavity. In the multipara the vaginal operation is usually satisfactory. Neither one, however, should be resorted to in mild cases when the woman is in good condition, the pelvis roomy, the cervix dilatable, and an easy delivery possible by version or forceps.

Owing to the popular belief that immediate emptying of the uterus yields the best results, cesarean section has become very popular in recent years in the treatment of eclampsia and preeclamptic toxemia. In fact, in some localities it is practically a routine procedure, in spite of the fact that statistics show that only accouchement forcé gives worse results. At Charity Hospital cesarean section in eclampsia shows a maternal mortality of 50 per cent, and the average mortality under the circumstances is about 30 per cent. Jellett, Stroganoff, Lichenstein and others have reported results by conservative measures which have never been equalled by the advocates of radical treatment. The true place for cesarean section in eclampsia is in those patients who do not go into labor in spite of convulsions, especially primiparae with narrow birth canals, and who grow progressively worse in spite of copious venesection, glucose infusions and other standardized methods of treatment. Section in these cases will yield better results than forcible delivery by the natural route. In eclampsia occurring before the thirty-second week I have found the vaginal operation decidedly more satisfactory than the abdominal one. When rapid delivery seems urgent it is undoubtedly safer than manual dilatation of the cervix followed by extraction.

The operation has been urged for various malpresentations, transverse, breech, even occipitoposterior, though it is hardly conceivable

that any such indications should be even considered unless some contraction or disproportion exists also. In Holland's study, its use in impacted shoulder resulted in a 50 per cent maternal and fetal mortality, which hardly commends its employment, particularly in view of the good results properly performed version or occasionally a mutilating operation will give. Its use in hydramnios and hydrocephalus is mentioned merely to be condemned.

There is a clearly defined field for it in labors complicated by tumors obstructing the pelvic canal, particularly those arising in the lower uterine segment. Even here, however, the field is strictly limited, as the majority of fibroids complicating pregnancy are in the fundus or rise out of the pelvis and so offer no serious barrier to normal parturition. When it is indicated, the majority of cases will demand hysterectomy as well. Tumors of the ovary obstructing the birth canal, if they can be dislodged easily, are more safely handled by laparotomy previous to delivery. In several instances I have removed such growths by laparotomy during pregnancy and the patients later delivered themselves without complications.

As I said at the outset, it is not my idea to decry the operation of cesarean section when it is properly performed upon definite indications. I have presented the subject to you with the idea of discouraging its promiscuous performance as a mere matter of surgical technic rather than a procedure based upon definite obstetric principles and employed only when those principles definitely warrant its performance. When it is employed according to strict limitations there is no more valuable obstetric procedure, and no procedure which carries a smaller minimum risk, but when once those limitations are transcended few abdominal operations carry a higher potential mortality. Because these are indubitable facts, proved by careful study and long experience, it is obvious that cesarean section is a serious operation, never to be lightly undertaken on careless indications but to be reserved for cases whose selection has been based on strict and definite indications.

512 HIBERNIA BUILDING.

BROW PRESENTATION AN ATTITUDE OF DEFLECTION, WITH THE HISTORY OF A CASE OF SPONTANEOUS BROW TRANSVERSE

By D. A. CALHOUN, M.D., TROY, N. Y.

DURING labor one is occasionally able to palpate, on vaginal examination, the anterior fontanelle lying lower in the pelvis than the posterior, even the forehead or root of the nose may be palpated, but after regular uterine contractions are established and the patient is placed in a suitable posture, the posterior fontanelle descends and labor will assume its normal mechanism. On the other hand, should the cause persist, the child remaining in an abnormal attitude, a pathologic mechanism results. All degrees of deflection attitudes may occur, in which the trunk of the child passes, in varying degrees, from its natural position of universal flexion, or C-shape to one of extension, or S-shape.

All cases of deflection attitudes cannot be attributed to any one cause, several factors frequently entering to produce the unfavorable presentation. In general, primary and secondary factors may be distinguished, that is, those active during pregnancy and those during labor.

The primary factors are given as any conditions causing a straightening of the child's trunk, such as tumors of the fetus, particularly of the neck, or in the uterine wall pressing on the fetal back. To my mind the predominating primary cause is the pendulous abdomen which favors extension of the head during pregnancy and at the onset of labor.

The secondary causes are as follows: Any condition preventing or delaying engagement of the head, contracted pelvis, relative disproportion of the head, pendulous abdomen, also a full rectum, bladder, or both, premature rupture of the membranes with the head extended, and weak labor pains, the latter cause not generally recognized.

Almost without exception the cause of the deflection is maternal and operates late in pregnancy and early in labor, but the rôle the child plays deserves mention. Fetal movements are often felt during vaginal examinations and it is easy to understand that, should labor begin, or the membranes rupture while the head is extended, the attitude may be fixed and deflection become exaggerated as labor progresses. If any of the above attitudes are discovered in labor, proper posture, that is, placing the patient on the side to which the occiput points, frequently will allow the breech to fall into the flank, the

occiput sinking and flexion of the head resulting. These deflection attitudes should not lead to hasty interference.

I am taking the liberty to reiterate the salient features of brow presentation. It is said to be distinctly pathologic and becomes very formidable if the weight of the child is normal or above. Small or macerated fetuses may pass through the pelvis spontaneously, though labor is difficult and much prolonged. The frequency of brow presentation is given as once in three thousand cases.

Abdominally the ovoid is longitudinal and very long, the flanks being quite flat. Above the inlet, to one side, is felt the hard round prominence, the occiput, separated from the back by a deep furrow. On the other side of the inlet the horseshoe-shaped jaw of the infant may be felt on a level with the occiput. Of great diagnostic import is the occurrence of the feet, fetal heart tones, and chin or chest on the same side of the maternal abdomen.

Internally, the point of direction is the brow, the large fontanelle on one side, the nose and orbital ridges on the other. The frontal suture runs transverse or a little obliquely. The nose should not be felt in a true brow, the orbital ridges being on a level with the posterior angle of the large fontanelle.

The point of direction is the brow; the two positions most commonly found are the brow to the left and anterior, and the right posterior. Since the dilatation of the cervix is slow, because an atypical diameter is presenting, the first stage is necessarily prolonged. During descent the frontal suture lies in the transverse diameter and is synclitic. When the brow reaches the pelvic floor it rotates to the front, the factors producing it being the same as in the normal mechanism. The brow covered by a large caput first appears, then with strong expulsive efforts, by a movement of flexion, the large fontanelle, the vertex, and the occiput pass successively over the perineum; the eyes, nose and chin then escape from under the symphysis. Rarely, the head may escape with the frontal suture lying transverse, that is, no internal anterior rotation has occurred.

Molding is very characteristic, the head having a three-cornered shape laterally. The face and nose flattened, the distance from the chin to the top of the head is very great, being exaggerated by a large caput.

Case Report.—Mrs. B., age thirty-seven, para viii was seen for the first time on July 11, 1922, then in her seventh month of pregnancy. Previous labors had been normal and uneventful. The pelvic measurements were ample and the fetus was the average for that period of gestation. The presentation at that time was breech with the back to the left. Until the time of admission, the patient visited the clinic regularly. The urine and blood pressure remained normal throughout. The fetus during each subsequent visit presented the vertex with the back to the left.

Patient entered the hospital October 4, 1922, at 8:30 P. M. The membranes had ruptured one hour previous to admission, and labor had not begun. She was at once examined. The abdomen was voluminous, with considerable adipose tissue, and very pendulous. Many silvery striae were present on the surface of the skin.

The size of the uterus corresponded to that of a full-term pregnancy except that it appeared longer than normal and flattened in the flanks. Palpation of the abdomen according to the first maneuver, revealed the breech in the fundus, but rather high up. The second, that the back was on the right side well around to the mother's back, while the small parts and chest were readily identified on the left, toward the midline. The deflexed head was easily recognized by the third maneuver, deflexed because the occiput and chin were on the same level. In addition, a deep furrow was found between the occiput and the back. A floating and freely movable head was found according to the fourth maneuver.

This complex of palpatory findings, together with the presence of the fetal heart in the left lower quadrant, is characteristic of deflection, and particularly of brow presentation.

Vaginal examination revealed the cervix two fingers' dilated, soft, thick and bilaterally lacerated. In addition the characteristic findings of brow presentation were present. On the right side, the anterior fontanelle was found high up. On the left, and at the same level, the orbital ridges were plainly palpated. The membranes had ruptured allowing a more certain interpretation of the findings. A small amount of amniotic fluid escaped during the examination. The patient not being in labor, a firm binder was applied with a rolled towel on the left side over the chest of the baby. She was put to bed and told to lie on her right side in hopes of correcting the deflection.

The following morning, October 5, the abdominal findings were similar to those previously described, and labor had not begun during the night. Castor oil and enemas were ordered and the patient allowed to get up and about with the binder still in place. At ten o'clock the same evening labor began, but the pains were weak and of short duration, occurring at twenty minute intervals. During that night the pains became more frequent and of longer duration. At nine-thirty the following morning the patient began to bear down with contractions which were now every three minutes apart and lasting fifty seconds. Descent had occurred and the chin at this time could not be felt abdominally. Satisfactory progress was made from then until eleven-thirty the same morning, when the brow appeared at the vulva with a fair sized caput present, the frontal suture lying in the transverse diameter of the outlet, face to the left, in which position, the head was delivered with a few expulsive efforts. Restitution and external rotation failed to occur, as no internal anterior rotation had taken place previously. The shoulders and body followed with equal promptness.

Molding of the baby's head was characteristic as described above. The nose was very flat and there were two deep abrasions present on the upper lip, due to the fact that internal anterior rotation had failed to occur and the long occipitomental diameter was forced between the tuberosities of the ischii. This diameter being considerably smaller, great pressure was brought to bear upon the upper lip and alveolar processes, with consequent destruction of tissue.

The case is instructive and interesting from the following standpoints:

Etiology: Early rupture of the membranes with the head extended, the result of a pendulous abdomen.

Diagnosis: The above-mentioned characteristic complex of palpatory findings, together with those of vaginal touch, facilitating the diagnosis.

Mechanism: Failure of internal anterior rotation is potentially dangerous even in a pelvis of normal size, not to mention an abnormal one.

108 SECOND STREET.

REPORT OF A CASE OF *UTERUS DUPLEX BICORNIS CUM VAGINA DUPLICI**

By John W. Price, Jr., M.D., Louisville, Kentucky

PATIENT M. R., aged twenty-three, first seen March 25, 1925; complained of recurrent attacks of abdominal pain, particularly in the lower right quadrant, extending over a period of several years. She had typhoid fever at the age of eight. Menstruation began at seventeen and was regular, duration three to five days, twenty-eight day type, with the abdominal pain aggravated during the epoch. Also complained of ''digestive disturbances'' for about ten years. She said she had dysmenorrhea in the winter but none in summer, and leucorrhea had been noted at various times during the last year. She was married four years ago, but lived with her husband only two months; she had never been pregnant.

Palpation revealed tenderness in lower abdominal area, particularly in right lower quadrant slightly below McBurney's point. Vaginal examination disclosed complete duplication of the vagina with two cervices, infantile in type. There was a septum attached to the anterior and posterior vaginal wall, thus completely dividing the vagina. The right vagina was slightly larger than the left, but two fingers could not be introduced therein to their full extent without causing complaint of pain. In the left vagina, the insertion of only one finger produced pain. Both cervices were readily palpated by the finger and easily seen by the introduction of a small speculum. Slight movement of the uterus caused severe pain, as did also palpation of the broad ligament area on either side.

Roentgen-ray examination showed definite obstruction to the passage of intestinal contents through the ileoccecal valve. Clinical diagnosis: Subacute appendicitis and bilateral chronic salpingitis, double vagina, double cervix, and double uterus. Operation was advised and accepted.

Celiotomy, by right rectus incision, March 27, 1925, disclosed the following: The appendix was enlarged, swollen, infiltrated and edematous, the thickness of an index finger and two inches long. It was adherent to the cecum and surrounded by desiccated lymph. Appendectomy: Ligation with plain catgut, stump cauterized and buried.

Exploration of the pelvis revealed two separate and distinct uteri, each cornu being infantile in type but almost the size of a normal uterus. Attached to each cornu in the normal situation was one oviduct, and there was one ovary on either side. The two cornua were separated throughout, except at about the level of the internal os where they were agglutinated. A peritoneal band, continuous with the urinary bladder, extended upward over the juncture of the two cornua and between them, and was finally attached to the sigmoid. This peritoneal band was loosely adherent to each cornu by web-like adhesions. Both oviducts showed considerable subacute inflammation; both were elongated and adherent to their respective ovaries and in Douglas' culdesac. The ovaries were slightly larger than normal and both were cystic. The left was larger and more cystic throughout than the right. (Fig. 1.)

Bilateral salpingectomy and left oöphorectomy were performed. No. 2 chromic catgut, continuous buttonhole stitch, was used for suturing the broad ligaments.

*Read before the Louisville Medico-Chirurgical Society, Louisville, Kentucky, March 27, 1925.

The abdomen was closed without drainage. No. 1 plain catgut was used for skin and peritoneum; No. 2 chromic catgut for fascia. Operative diagnosis: Subacute appendictis, bilateral salpingitis, *uterus duplex bicornis cum vagina duplici.*

Scrutiny of available literature for the last few years shows that Catlin (1924) reports one autopsy case of double uterus, and states that he found "less than one hundred and fifty similar examples in the literature," but none of these are listed. Wardlow and Smith (1922) review the literature and report two cases. They quote Rockey as saying that the first sixty volumes of the *Annals of Surgery* made no mention of the condition. In the elder Ashhurst's textbook on
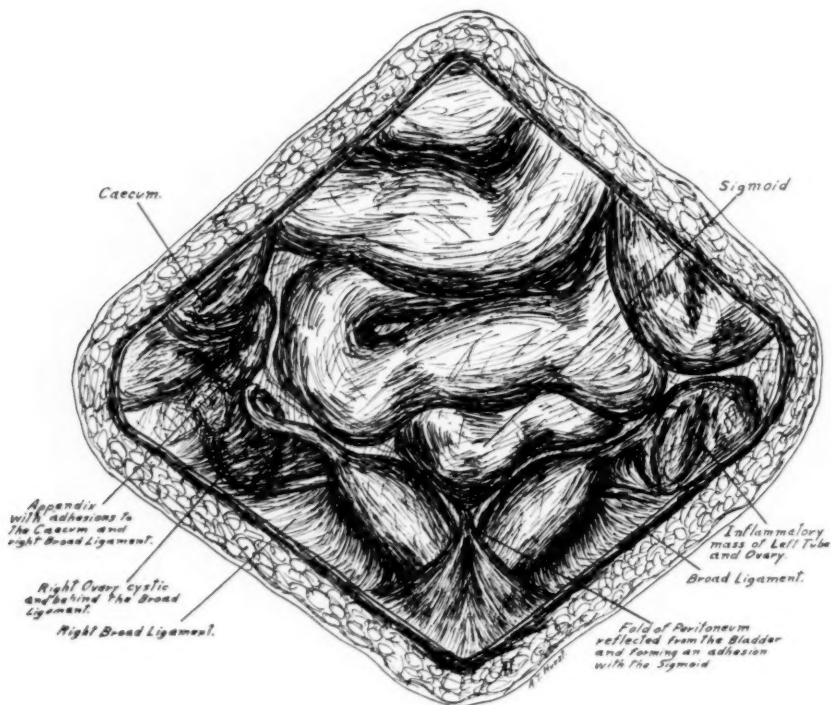
Fig. 1.

surgery, published about 1880, Parlin tabulates eight cases from the literature. Kelly's textbook on operative gynecology (1898), illustrates one case, and Fisher reports a case in volume five of Keen's surgery.

Guilleminet and Michou (1924) tabulate fifty-eight cases of different dual malformations of the uterus and refer to ten unpublished observations. Humpstone (1920) records two cases of pregnancy in the rudimentary horn of a bicornate uterus. In one, the horn ruptured, and in the other, a dead fetus was removed by hysterotomy and later hysterectomy was performed.

Cornell and Earle (1919) report a case of uterus bicornis unicolis

with two ova implanted in one horn and a fibroid tumor in the other. Haddon reported a case of double uterus and double vagina, in 1922; Guy one, in 1924; also Van Zwalzenburg, Card, and Jones one, in 1924. Eymer recorded two similar cases, in 1923, and said he could find only seventeen others in the literature.

In the brief literary survey, it was noticed that several authors commented on the fact that there was only one oviduct attached to each cornu in double uteri. It seems strange that oviduct duplication should be even mentioned in these cases, when one considers the embryology of the uterus and fallopian tubes. So far as available literature shows, no instance of oviduct duplication has been recorded in connection with double uteri.

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Society Transactions

OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING OF JANUARY 8, 1925

DR. EDW. A. SCHUMANN presented the following case reports: 1. **An Enormous Parasitic Fibroma Originating in the Uterus.**

Frankford Hospital. 7530 B. The patient, admitted June 25, 1924, was a married, sterile woman of forty-three years who had noticed an increasing enlargement of the abdomen for the past sixteen months, but no other symptoms. Menstruation was regular and normal until three months before admission, when the patient noted some irregularity which was ascribed to the onset of the menopause. The past medical history was irrelevant. Physical examination revealed a well-nourished woman with no evidence of illness save a huge enlargement of the abdomen, a dense, hard mass extending from symphysis to epigastrium and filling both flanks.

On vaginal examination the perineum and cervix were normal, the uterus was small and above it lay this tumor, seemingly bilateral as though a large tumor occupied the right side of the abdomen and another smaller one the left. Blood and urine normal.

On operation (ether anesthesia, median laparotomy) there was found an enormous hard fibroid springing from the fundus uteri by a pedicle 4 cm. in its greatest diameter. On incising the pedicle slight hemorrhage resulted, the blood supply of the tumor being derived almost entirely from the omental apron which was spread over its upper anterior surface and from which veins and arteries, some of the former 15 mm. in diameter entered the tumor mass. By actual count there were twelve of these huge aberrant blood vessels vascularizing the fibroma. The bladder was spread out fanwise over the lower aspect of the growth with some extra blood vessels entering the tumor from the peritoneal reflection. The omentum was amputated at its colonic border, the great vessels ligated, the bladder peritoneum freed and an easy myomectomy was performed. Convalescence was rapid and uneventful.

When drained of its blood the specimen weighed twenty-five pounds and measured 38 by 20 by 16 cm. in size, being roughly oblong in shape, with its small pedicle at its lower extremity; the largest growth of the kind I have ever encountered.

The tumor was a well vascularized, homogenous fibroid with one cyst cavity whose lining cells gave some suggestion of sarcoma.

The above case is presented to emphasize three gynecologic facts: (1) The immense size of the tumor and the entire absence of pressure symptoms. This patient had no knowledge of being in any way unwell except that she grew larger about the middle. (2) The lack of displacement of the abdominal viscera. The healthy abdomen seems well filled by its normal contents but here was an added growth 38 by 20 cm. which caused no appreciable displacement of any organ, all falling into their normal relations, the moment the tumor was removed. (3) The very rich blood supply derived from the omentum alone and the fact that the tumor was almost entirely independent of its original source.

2. Ovarian Carcinoma with Twisted Pedicle and Fatal Intraperitoneal Hemorrhage.

Frankford Hospital, 7957 B. The patient, admitted August 18, 1924, was a married, parous woman of thirty who gave no medical history of relevance, had borne one child, delivered by forceps, the delivery followed by a plastic operation. Menstrual history uneventful except that she had two menstrual periods during the month prior to admission.

The present illness began four days before she came into the hospital, with uncomfortable feeling in the abdomen as if overloaded with food. She had some diarrhea and a little dysuria. There was rather marked weakness but the patient did not appear very ill.   Physical examination revealed a thin, pale woman with a slight impairment of resonance in the left chest, heart negative. The abdomen was distended with some bulging in the flanks, the umbilicus prominent. A large, firm mass in the right hypogastrium extended from the pelvis to six fingers, breadth above the symphysis and was extremely tender to touch. A fluctuation wave could be elicited in the flanks. The patient stated that the abdominal mass had increased greatly in size during the last four days.

On vaginal examination, the perineum and cervix were those of a normal multipara, the uterus was moderate in size and fixed in the body axis. A large, tender mass was found in the right side, not fixed, smooth in outline and giving a sensation of being under great tension. A small mass was felt in the left side.

The urine was negative. Blood showed 70 per cent hemoglobin, 3,780,000 red and 17,200 white cells. Temperature 99°. Based upon the physical findings, the history and the blood picture, provisional diagnosis was made of (1) huge salpingitis (2) malignant tumor of ovary undergoing necrosis.

Operation: Under ether narcosis, a median laparotomy revealed an immense recent intraperitoneal hemorrhage, many fresh clots and a large amount of liquid blood escaping.

The uterus, left tube and ovary were found to be normal. The right ovary was the seat of a solid tumor, 20 by 15 cm. in size, twisted twice on its pedicle and bleeding freely from various points on its surface.

The small intestine and the bladder were closely attached to the growth by recent and very vascular adhesions. Rapid oöphorectomy with an attempt at peritonealization was performed, the patient going into extreme shock. Under appropriate intravenous stimulation, transfusion, etc., she rallied somewhat but died from shock and hemorrhage six hours later.

The specimen removed consisted of the right tube and ovary. The tube presented a complete closure of its fimbriated extremity and contained 10 c.c. of clear straw-colored fluid.

The ovary measured 20 by 10 cm. There was little if any ovarian stroma left, the whole mass being composed of a tissue the consistency of liver and yellowish white in color. Small areas, apparently inclusive cysts contained gelatinous material.

Many areas of hemorrhage were found over the surface of the tissues as well as in the stroma. Microscopically the growth was a typical small cell, solid carcinoma of the ovary.

The above case presents two significant clinical phenomena: 1. The magnitude of the hemorrhage and the very slight reaction on the part of the patient to so great a blood loss.

2. The fact that the malignant tissues of the ovary reached the proportions they did, with the patient unaware of their existence until a twisted pedicle caused the onset of symptoms.

3. A Massive Retroperitoneal Lipoma Springing from the Perirenal Fat.

Frankfort Hospital, 3224 A. Admitted October 6, 1918. The patient, a spinster of forty-one, complained of a sense of dragging in the abdomen, and a fulness in the right flank. The woman had been well except for the dragging refer- red to, which had been slowly increasing in severity for the past ten years. On examination, the patient was found to be a well-nourished woman with no demon- strable chest lesions. Blood and urine were normal. The abdomen presented a distinct, soft tissue mass in the right lumbar fossa, without apparent displacement of the colon.

The perineum was intact, the outlet virginal, the cervix large, thickened and protruding from the vulva. The uterus was retroverted to third degree and in marked descensus.

A tumor the size of an adult head was noted in the right flank, not definitely connected with the uterus.

Operation: Under ether narcosis, median laparotomy was performed, the uterus removed by supravaginal hysterectomy, the cervial stump anchored to the broad and round ligaments. The large tumor was seen to be covered with peritoneum and to spring from the region of the right kidney. When the peritoneum was split, a large lipoma was revealed and was easily shelled out, with no hemorrhage. The growth had its source in the perirenal fat of the right side.

The convalescence was impaired by reason of the development of a pulmonary embolism, from which the patient made a complete though delayed recovery.

The specimen consisted of an ovoid tumor 18 by 12 cm. which was a pure lipoma, very poor in connective tissues and consisting for the most part of the usual fat lobules so characteristic of this form of new growth.

DR. RALPH GOLDSMITH reported a case of **Endometrial Ovarian Cyst with Unusual Clinical Features.**

M. P., aged twenty-one years, married, white. Patient was always well until May, 1919, when she was operated upon for what she was told was acute appendicitis, ruptured. She was in the hospital for about nine weeks at that time. Since then she has had attacks of severe abdominal pain about every four to six months, always at the time of her menstrual period. In the last six months these pains accompanied every period and grew steadily worse, cramp-like and were most severe in the lower abdomen. Periods were regular, 28, flow moderate, 5 days. No discharge. She had been married for two years, during which time she had never been pregnant nor had she taken contraceptive precautions. At each period two bluish-red bullae, located in the abdominal incision, discharged dark blood. After the period they closed and appeared as ''blood blisters'' Patient complained of indigestion of an irregular type with epigastric pain. There was nausea but no vomiting. She was obstinately constipated and bowels moved only with considerable difficulty. This condition obtained only since her operation. In her attacks the pain was sometimes severe enough to cause fainting. Previous medical history and family history entirely negative.

Patient was first seen on July 19, 1923, at which time she was in great pain and appeared to be suffering from partial intestinal obstruction. She was in the midst of a menstrual period. A little dark red blood exuded from the two openings in the old lower midline abdominal incision. Under treatment her acute symptoms subsided so that four days later she could be examined with more satisfactory results. At that time examination showed a fairly well-nourished young woman

who appeared pale and ill. Weight, 116¾ pounds, a loss of twelve pounds in the past two and one-half months. General examination was entirely negative.

There was a lower midline scar covered with a bloody crust at the lower extremity, tenderness in the epigastrium and all over the lower abdomen; no masses palpable. Lower abdomen was very tympanitic and peristalsis active. No evidence of Neisserian infection; the uterus in retroposition and bound down. There was tenderness in Douglas' pouch and in both fornices but no mass or nodule was anywhere definitely palpated.

It was felt that in view of the unsatisfactory general condition of the patient, operation had best be deferred until she could be built up. However, she continued to have symptoms of intestinal obstruction and became steadily worse, so that operation became imperative.

Operation: On August 4, at the Jewish Hospital. The old scar was excised and the sinuses through which the bloody discharge had come were traced to the right ovary, which was found to be the seat of a dark, fairly thin-walled cyst about 7½ cm. in diameter. The entire pelvis was a mass of adhesions of almost cartilaginous density. The sigmoid was firmly affixed to the fundus of the uterus, the line of cleavage being extremely difficult to discover. The sigmoid was sharply kinked at this point accounting for the obstructive symptoms. The cystic right ovary was high and was firmly attached to the cecum. The appendix had been removed. The adhesions were released, the right tube and ovary and the left tube were removed. The left ovary was not found. The sinus was excised. In freeing the sigmoid, it was buttonholed in two places. The shock incident to the release of the adhesions was so severe that it became imperative to get the patient off the table with the least possible delay. Therefore, there was no attempt to make a general peritoneal exploration or to do a hysterectomy. The convalescence was stormy in the extreme. There was postoperative collapse of a most alarming degree for three days, followed by acute follicular tonsillitis on the fifth day and the development of a fecal fistula on the eighth day. Thereafter, however, the patient steadily improved and was discharged on September 30 with the fistula still discharging a very small quantity of fecal material. The fistula closed spontaneously about November 1 and has never reopened. About this time patient moved to another city and could not be traced until December 2, 1924. She then stated that she felt perfectly well, weighed 130 pounds and had no trouble with digestion or bowels, the latter being regular without laxatives. She had menstrual periods since operation; libido is unimpaired. The wound was firmly healed, no hernia, no fecal fistula; bimanual examination showed the uterus in normal anterior position. There were no masses or nodules in the culdesac or rectovaginal septum. Slight tenderness in the right fornix only.

The tumor was a typical endometrial cyst, as described by Sampson and others. It contained so-called chocolate-syrup material and upon microscopic examination showed the usual appearance of such cysts.

Comment: So far as can be determined by a search of the literature as well as by a personal communication from Dr. Sampson, there is no case on record of an endometrial cyst which could be so readily and certainly diagnosed preoperatively. The discharge of bloody material through the abdominal sinus coinciding with the menses made it practically certain that there was a communication between the surface of the body and either an endometrial cyst or the cavity of the uterus itself. The latter possibility seemed far the less likely of the two. Every effort was made to obtain the diagnosis and operative findings at the previous operation in 1919 but unfortunately, the record of the patient could not be found at the hospital in which she was operated upon.

In view of the fact, however, that the left ovary could not be found, it is at least possible that it may have been removed for a similar condition at the previous operation. Color is lent to this theory by the fact that the patient suffered severely from the symptoms of premature climacteric and obtained considerable relief from the exhibition of corpus luteum extract. That she has since menstruated occasionally may be explained by the theory that some ovarian tissue may have been left behind at one or the other operation.

Sampson states that the average size of such cysts is 2 to 4 cm. in diameter. Hence, the cyst in this case was considerably larger than the average. The mass of dense adhesions is a typical finding in such cases and is explained by the periodic leakage of the highly irritating contents of the cyst into the pelvis setting up an aseptic inflammation resulting in peculiarly abundant and tough adhesions.

DISCUSSION

DR. CHARLES C. NORRIS.—There are, of course, a number of histories recorded of patients with whom the fallopian tube has been in communication with an abdominal sinus and menstruation has occurred through the latter. These have, however, an entirely different etiology from the case under discussion. I believe that Mallory has recorded one or two instances in which endometrial implants have grown in the abdominal wound.

Perforating cysts are among the most frequent of gynecologic lesions. The theory of Sampson regarding their etiology is, I think, generally accepted. Two other theories which have been suggested are, that the lesions may develop from the endothelium or from embryonal rests. It is possible that some of the cases may be accounted for by one of the latter theories.

The outstanding clinical feature of these cases is dysmenorrhea, while the most important gross pathologic lesions are ovarian cysts, usually small, containing chocolate-like blood, adhesions associated with patent tubes; occasionally one tube will be found included. The lesion may or may not be bilateral.

We have had two remarkable cases, in one of which the clinical history suggested a ruptured ectopic pregnancy and in the other the clinical diagnosis was a dermoid cyst with torsion. In both of these cases rather large perforating cysts were present, which had ruptured.

This epoch-making investigation by Sampson has opened up many fields for research. It is a question of how frequently the implants undergo malignant degeneration; whether or not these lesions play any part in the etiology of ovarian neoplasms in general. It seems proved that they are in many instances the chief factor in the production of adenomyomata. Lewis has suggested that in cases of tubal pregnancy the implantation of the ovum occurs upon one of these endometrial implants and that the decidual changes so frequently found in spots over the pelvic peritoneum may be accounted for by previous implants. It has also been suggested that when true ovarian pregnancies occur they only develop in the ovaries, the seat of an endometrial transplant.

It would seem from their histology, that in many instances small implants must be left behind after operation and what part, if any, these subsequently play is as yet undetermined. Most of our cases are too recent and none have been studied especially with this thought in mind to enable the expression of a useful opinion. Many cases I know have been cured by operation but the question of whether, provided menstruation continues after operation, there is any tendency for the further development of transplants which may have been left behind after operation is worthy of observation.

DR. FLOYD E. KEENE.—The following case during the past year demonstrates the value of keeping this type of cyst in mind, forming as it does a very unusual manifestation that permitted us to make the diagnosis before operation. The patient was a woman about forty-five years of age who gave a history of bladder disturbances which were present only at the time of menstruation with no intermenstrual discomfort. She had never had hematuria. On vaginal examination, the uterus was enlarged and to the left of the uterus was a semisolid adnexal mass. On cystoscopic examination, we found several small vesicles situated to the left side of the base of the bladder just behind the left ureter. These were about the size of a pea and closely resembled the blue-dome cyst of the breast which Bloodgood describes. There was no ulceration. The kidneys were normal both anatomically and functionally and the urine showed no pus. The symptoms were of some four years' duration, therefore, it seemed that one could rule out malignancy of the bladder, either primary or secondary, and renal tuberculosis. The Wassermann was negative. The diagnosis was made of an endometrial cyst of the ovary with perforation into the base of the bladder. This diagnosis was confirmed by operation.

DR. BROOKE M. ANSPACH and DR. HAROLD W. JONES presented a paper entitled **The Treatment of Secondary Anemia by Blood Transfusion Preceding Operation for Myoma Uteri and Pelvic Inflammatory Disease.** (For original article see page 222.)

DISCUSSION

DR. EDWARD A. SCHUMANN:—I desire to emphasize the sharp distinction regarding the value of transfusion between cases in which the blood loss is a mechanical one, due to solution of continuity of vessels and in those cases where the anemia is due not to direct blood loss, but to the hemolysis as the result of inflammatory processes or blood stream infection. An extensive series of cases in the Frankford Hospital showed that, while in the acute anemias of hemorrhage our cases reacted beautifully to transfusion, the results in inflammatory cases were negligible; indeed where the cases were fairly acute the results were nearly always bad. The results of the observations have convinced me that in active inflammatory cases transfusion is of little or no value and may indeed do great harm.

DR. JOHN A. McGLINN.—More important than the degree of anemia present is the condition of the heart muscle. These cases with bad heart muscle die after operation. Muscle changes result from long continued bleeding and I do not believe that it is wise to operate a few days after transfusion, unless the heart has good muscle tone. In reference to the chronic inflammatory diseases my own experience is very much like that of Dr. Schumann as to the value of transfusion. So soon as we get hold of a case of chronic pelvic inflammatory disease we begin to fight the anemia by forced feeding, by open air and by the exhibition of such drugs as arsenic, citrate of iron or cacodylate of soda. In our experience transfusion has not been of much value as the results are only temporary. We have been using nonspecific protein since Gellhorn mentioned it about five years ago. Dr. Averett and I have used, in a large series of cases, milk injections with treatment to combat the anemia and we believe our results are better than when we depended on transfusion. We feel that a great part of the good resulting from transfusion is due to the protein reaction. I do not believe that in the very acute infection transfusion is a good thing to do.

DR. BROOKE M. ANSPACH.—I feel quite the other way with regard to subacute pelvic infections, which continue to have fever. In the two cases I have shown

I feel that it was the one thing that got the patient over the top. None of these cases in which we have used it were viridans infections. There have been no cases of septicemia. In diseases we have used blood transfusion, it has proved a distinct addition to our treatment. In the pelvic inflammatory cases there is every reason to believe that it will act as a foreign protein as well as to stimulate the blood-making organs.

DR. HAROLD W. JONES.—I did not want to give the impression when I spoke of septicemia and the use of transfusion that we were speaking of the bacteria in the blood stream. I wish to corroborate what Dr. Anspach has said from my viewpoint that transfusion in infectious conditions in the peritoneum has proved very successful. I do not recall any patient who had pelvic inflammatory disease who was not benefited by it, in the face of a mortality of about 75 per cent. We use whole blood and I have never seen a serious reaction in the case of secondary anemia with the exception of those mentioned. We have done at the hospital about 700 transfusions in conditions of secondary anemia, and about 300 in primary anemia. The case of Streptococcus viridans infection was not a gynecologic or obstetric case, but it was a man in the hospital nineteen weeks who is perfectly well today.

DR. CHARLES S. BARNES and DR. J. H. CLARK (by invitation) presented a report of a case of Chorioepithelioma Malignum.

Mrs. P. B., Albanian, was twenty-seven years of age. History probably of three pregnancies, one full term in 1920; the child died of tuberculous meningitis at two and one-half years. One spontaneous early abortion, her attending physician believes occurred during the illness of her child, without any complications. This was some six months previous to her final illness. On May 9, 1924 she had a spontaneous abortion at two and one-half months. Nothing unusual was noted at the time except perhaps rather excessive hemorrhage. Moderate bleeding persisted, the patient apparently making slow recovery, when at the end of ten days, sudden and severe metrorrhagia occurred. The patient was taken to a hospital, curettage performed with very little tissue resulting and uterine packing done. The writer first saw the patient with her physician three days later, May 22, 1924. On removal of the packing there was no considerable hemorrhage. Some enlargement of the right adnexal region was noted and a probable diagnosis of old inflammatory disease made. The patient was allowed to return home four days later. During the week's stay of the patient in hospital, the temperature varied from 97.2° to 99.4°, pulse 64 to 100.

Two days following her return home genital bleeding suddenly became so serious as to necessitate uterine and vaginal packing. At this time, suspicions already entertained of chorioepithelioma, were confirmed, by detection of a small flat mulberry-like nodule (resembling a localized varicosity) midway in the anterior vaginal wall. This was the site of most of the hemorrhage at this time.

The next day, after admission to a hospital, the vaginal growth was excised, a laboratory report pronouncing it chorioepithelioma.

At this time, there was increased muscular tension, tenderness and pain with a palpable mass in the right lower abdominal region. Anemia was marked, hemoglobin 30 per cent, erythrocytes 2,500,000, leucocytes 6,350.

Evidently the patient was a very poor surgical risk, but it was decided to give her a chance of life, by panhysterectomy. She had a preoperative temperature of 100°, with a correspondingly rapid pulse.

Extension of the malignancy into the right broad ligament made hemostasis in this spongy tissue exceedingly difficult, suture ligature being freely employed.

Despite most of the means for combatting such a condition (including blood transfusion) the patient succumbed to shock fourteen hours subsequent to operation.

This patient as to age, multiparity, and symptomatology presents an average case of its kind. The malignancy doubtless began before the termination of pregnancy by abortion, three weeks previously. There were no symptoms indicating metastases except that to the vagina and the right broad ligament. The primary growth, comparatively small, was situated in the fundus of the uterus. No necropsy was secured.

NEW ORLEANS GYNECOLOGICAL AND OBSTETRICAL SOCIETY

MEETING OF FEBRUARY 12, 1925

DR. P. B. SALATICH presented the following account of two cases of **Congenital Atresia of the Vagina.**

Most surgeons of experience agree that the earlier operations for establishing an artificial vagina by opening the cellular tissue between the bladder and rectum and maintaining the opening by tampons or plugs have uniformly failed. The first man to operate by incision of the rectovesical septum was de Haen (January 25, 1761) and between that time and 1904, when the Baldwin operation was devised, over twenty-five different methods had been suggested. The Beck operation, which is probably the best of the grafting methods, utilizes large pieces of skin graft taken along the inner sides of the thighs at the vaginal outlet and turned so that the raw surfaces come in contact with the reconstructed vagina. It is not very successful. Even if it does not contract, mucous membrane, when it is long exposed, comes to form a very fair substitute for skin but the converse of this is by no means true and a skin lined vagina must differ very widely from one formed with normal mucous membrane. Most of these cases require long continued tamponing or retention, either continuously or intermittently, to keep them from contracting.

CASE 1. Miss V. D., sixteen years of age, first consulted me in 1918. At that time she was slender but well-formed, apparently perfect in health and rather an attractive girl. She had never menstruated, but as the general physical examination was negative and there were no apparent pelvic symptoms, I made no pelvic examination, simply prescribing a tonic and advising her to return if menstruation did not appear. I did not see her again until 1923. When I learned that menstruation had never appeared I made a pelvic examination, only to find no evidence at all of a vagina. When the situation was explained to the patient and to her mother, they were both insistent that I do something, and although I explained to them the extent and the seriousness of the necessary procedure they were willing to take the chance.

A typical Baldwin operation was done a month or so later. Both ovaries were fairly normal in size but each contained several small cysts, most marked towards the lateral pelvic walls. The tube on the left was fairly normal, but there was no evidence of a tube on the right. The uterus was divided into two parts, widely separated, that on the right about the size of a pecan and that on the

left about the size of a lime. Connecting these parts was a cord-like arrangement about the size of a round ligament. The operation was done without incident and following the usual technic.

I might mention a few points which impressed me particularly. In the first place, the Baldwin operation is a very extensive one and it should not be attempted by men who have not had considerable experience in intestinal and plastic surgery. Dissection with the broad blade scissors and the finger was rather easy after the rectovaginal septum had been incised; in fact, it was surprising to see how readily these tissues yielded so as to accommodate two fingers. I consider lateral anastomosis of the bowel, when possible, the quickest and safest of all methods. Before the ends of the bowel are closed the mates of a Murphy button are slipped into each lumen and can be connected quickly by simply making a small incision over the openings in the button. Then the button is pushed together and no sutures are necessary. Baldwin advises that the resected bowel be pulled into the newly made vagina and covered with peritoneum. This puts the mesentery at a great tension and I was not able to accomplish it but had to be satisfied with leaving the ends of the bowel in the abdomen and suturing the peritoneum around the lumen. I do not believe this particular feature makes any difference and in the future I shall save time by not attempting it at all. I used a few interrupted catgut sutures to bring the sections of the bowel together, so that when the clamp was placed on them the mesentery would not be caught. Some do away with clamping, claiming that the angle will stretch upward sufficiently. I used silk sutures to connect the bowel to the incision in the vulva.

The patient's recovery was uneventful. She had some disturbance at first from excessive bowel secretion but this was promptly checked by a few applications of silver nitrate. Examination a year after the operation showed a vagina four or five inches in length with a certain amount of muscular contractility, and large enough to accommodate two fingers. The bowel secretion had disappeared entirely.

CASE 2. This patient was twenty-nine years old, a sister in religion, who consulted me for disturbances connected with the urinary bladder. She had never menstruated and claimed that she had never had symptoms arising from the condition. When I examined her a congenital absence of the vagina was found. The rectal examination was very unsatisfactory and I could not make out either the uterus or the ovaries. Her vocation of course precluded any operative measures for relief.

DISCUSSION

DR. M. J. GELPI.—I can recall having seen only two such cases. In one instance there was a rudimentary vagina present, and I can testify from my own experience how very difficult it is to keep such a tract open. I tried for a number of months but when I last saw the patient the results were still not satisfactory. In this case, as I have said, the uterus was rudimentary, perhaps the size of the end of the little finger. The second case was one in which I helped Dr. E. S. Lewis some thirteen years ago. He used a very simple procedure, grafting skin from the labia and thighs, which gave a definite cavity perfectly satisfactory for all purposes. As I recollect it, the Baldwin operation was not in common use at that time.

DR. J. S. HEBERT.—In 1920, on Dr. C. Jeff Miller's service at Charity Hospital we had a similar case in a young woman of twenty-two who applied for operation only because she was engaged to be married. She had been quite

ignorant of her condition until informed by her friends that a monthly flow was normal and to be expected. Dr. Miller operated, with findings similar to those in Salatich's case. One ovary was rather small and the other just a remnant, and the uterus was very small and undeveloped. The Baldwin operation was done with excellent results. Dr. King and I watched her over a considerable period of time afterwards and used bougies for dilatation, and I think the case ended as satisfactorily as was possible under the circumstances. I certainly believe that these patients should be fully acquainted with the risk they are undertaking before operation is done. In this instance the gravity of the procedure was carefully explained to the patient but in view of her desire to be married she was willing to take the chance and the outcome was certainly very happy.

DR. HILLIARD E. MILLER.—I should like to ask Dr. Salatich whether he found dilatation or the use of packs and tampons necessary after the operation. In the case Dr. Hebert has mentioned I remember that the healing was entirely primary and the operative results brilliant. There was some tendency toward contracture of the vagina at first but when the patient was last heard from, about a year ago, this condition had entirely disappeared.

DR. SALATICH (closing).—I made the vagina as roomy as I could under the circumstances; I could introduce two fingers and I tested it out to be sure it would stretch. In reply to Dr. Miller's question, at the time of operation I used a pack of iodoform gauze, inserting it as snugly as possible. This pack was removed at the end of a week and another deep one inserted in its place. At the end of the second week smaller packs were used, but at the end of the third week complete healing had taken place and all packing was discontinued. We cannot ignore such cases in private practice as we do on a public hospital service. Such patients come to us in real distress and it is essential that we do something to relieve their condition.

DR. W. D. PHILLIPS reported a case of **Hematometra Following Amputation of the Cervix and Radiation.**

Mrs. O. W. B., aged thirty-two, first consulted me in November, 1919. She had an extensive bilateral laceration of the cervix, a complete laceration of the perineum, and a moderate cystocele. I did the usual operations for the relief of the cystocele and the lacerated perineum and because of the extensively diseased condition of the cervix and the large amount of scar tissue present I did an amputation of the cervix. Examination of the portion removed showed no malignancy but a definite disturbance of the cell relationship. Recovery was uneventful and the patient was apparently perfectly well until March, 1922, when she again consulted me because of profuse leucorrhea and prolonged menstruation. Examination showed a small opening in the cervix and the surrounding tissues had a granular appearance, were markedly indurated, and bled freely on touch. The condition seemed definitely malignant but another section examined in the laboratory was reported back as after the first operation, no malignancy but disturbed relationship of the cells. The clinical evidence of carcinoma, in spite of this report, was so strong and the profuse uterine hemorrhage so urgently demanded relief that I gave the patient a moderate dose of radium, 600 mg. hr. The uterine hemorrhage continued intermittently for a year and the clinical evidence of cadcinoma also persisted, therefore in May, 1923, I gave her 1200 mg. hr. of the radium element.

Following this application there was a marked local reaction associated with a foul discharge, and the clinical appearance was more than ever suggestive of

carcinoma, though in the light of what followed I realize that it was only the radium reaction. After two or three months the patient gradually improved, and her condition was good until January, 1924, when she consulted me again, complaining of pain in the left lower abdomen, fever and chills. Menstruation had been checked for five months. Examination showed the cervix in much better condition. It was definitely patulous though the opening was small. There was some induration in the posterior vaginal wall. In May, 1924, pain developed in the hips, though otherwise the patient was well, and in October, 1924, the abdominal pain returned.

Examination at this time showed the cervix apparently obliterated and a large mass on the right of the pelvis and forward in the direction of the bladder. Rest in bed relieved the pain but the mass increased in size and eventually the pain returned very much more severely. A diagnosis of cervical atresia and possibly hematometra was made and operation was advised. December 10, 1924, under nitrous oxide anesthesia an attempt was made to expose the cervix. The walls of the vagina were adherent in front of the cervix and completely obliterated it. These adhesions were separated by scissors and forceps and by blunt dissection and what appeared to be the cervix was finally exposed. A pair of forceps was introduced into the small opening which I took to be the cervical canal and as the opening was enlarged possibly half a pint or more of thick, chocolate-colored fluid escaped from the uterus. The opening was thoroughly dilated and the uterine cavity packed with iodoform gauze. The patient was immediately relieved of pain, her recovery was uneventful, and she was discharged in excellent condition eleven days later. The discharge persisted for several weeks.

I have seen the patient several times since and her condition is apparently excellent. The point I would stress in this case is the value of repeated examina tion following amputation of the cervix and also following radiation, since the expected amenorrhea may be due, as it was in this instance, to other causes than the effect of the radium.

DISCUSSION

DR. HILLIARD E. MILLER.—Up to three years ago we saw some very marked cases of contracture of the vagina following the use of radium in big doses for carcinoma of the cervix. Since then we have been suggesting to our patients the use of a daily douche until they report back to us for examination three months later. At least a gallon of water is used and the can is held high, so that the vaginal walls are thoroughly flushed and stretched. Since the adoption of this simple measure our cases of stricture have been very infrequent. I am wondering whether in the case reported the uterine condition was the result of defective screening. We once found quite frequently a foul, persistent discharge following the use of radium in rather large doses in celluloid capsules but since we have been using a rubber screen, about the thickness of an ordinary catheter, we have not had this trouble. I really believe that most of such discharges are due to radium burns from an improper screening of the alpha and beta rays.

DR. P. B. SALATICH.—About a week ago a woman who consulted me said that following an amputation of the cervix, menstruation had stopped altogether after five or six months. As she was only twenty-five she realized that something was wrong, so she returned to her original surgeon, who told her that dilatation was necessary to correct the condition. The procedure afforded her no relief at all. When I examined her I was astonished to find no evidence at all of a cervix. The entire vaginal vault was smooth and empty except for multiple adhesions. Careful examination before discharge, such as Dr. Phillips

suggests, would have prevented the occurrence of such a condition as this. Another possible explanation is the use of catgut alone for suture material as it absorbs in the vagina faster than anywhere else. For this reason I am accustomed to use a silkworm suture as well on each side of the cervix. I place deeply one suture on each side of the cervical canal and on the tenth day I find them still there, so that healing occurs without any chance of occlusion. They are easily removed within six or eight weeks after operation, although when I have done a perineorrhaphy as well, I permit them to remain from three to six months afterwards. I have frequently found prolonged discharges following radiation. I recall one patient particularly who consulted me following the use of radium for a supposed metrorrhagia. The metrorrhagia subsided but a very offensive discharge persisted, and when the patient consulted me some five months later she apparently had all the marks of a definite malignancy. I advised hysterectomy, to which she submitted. When the uterus was opened up after removal, a deep slough was evident almost to the exterior on both sides and the contents were so offensive that the specimen had to be destroyed almost immediately. I should like to ask Dr. Phillips whether he has had difficulty keeping his incision open and whether he ever considered the use of a stem under such circumstances. Personally I do not like pessaries.

DR. PHILLIPS (closing).—I have little further to say except to emphasize again the necessity of watching patients after amputation of the cervix has been done or radium has been used. We usually operate on them and then send them home. We hear from them later that menstruation has stopped, and as that is exactly what we hoped would happen we do not investigate further, so that local conditions, unless they give rise to symptoms, may pass entirely unnoticed. In reply to Dr. Salatich's question, I have had considerable difficulty in keeping the incision from healing over. I have been using packs in this case but in the future I am considering the use of a stem after amputation has been done. When the cervix has been removed by high amputation the mucous membrane folds over and occlusion is perfectly possible.

DR. MAURICE J. GELPI, New Orleans, La., discussed the **Logical Handling of Nonmalignant Cervical Disease, Including Congenital Deformities, Lacerations, and Inflammations.**＊

The treatment of stenosis and acute flexions is fairly well established and resolves itself into overcoming, as much as possible, the obstruction to the cervical canal, by the various types of stem pessaries and plastic operations. These are more or less efficient in the hands of different individuals.

In the handling of lacerations and inflammations, the logical surgical procedure should be determined by the pathology. For immediate lacerations, nothing should be done primarily except in presence of hemorrhage. I object to immediate repair because of the danger of spreading infection, the frequent impossibility of determining accurately the extent of cervical damage, and the inadvisability in many instances of prolonging a difficult labor by unnecessary surgical procedure.

In considering the treatment of old lacerations, certain fundamental points should always be borne in mind. When the cervical disease is primarily a laceration and the cervical discharge to be relieved results from the exposure of the cervical glands to the acid vaginal secretions, and is not due to deep-seated infection, then the procedure of choice in childbearing women, when conditions permit, should be trachelorrhaphy.

＊Author's Abstract.

The cervical infections which call for direct surgical treatment are all essentially chronic, and can be grouped into two classes,—the superficial infections and erosions requiring conservative treatment, and the deep-seated infections requiring radical treatment. The pathology determines the logical surgical procedure. Without going into details of technic, let me say that the point to be stressed is that one should not say, without qualifications, "I prefer trachelorrhaphy," or "amputation," or "Hunner cauterization." The logical attitude should be to base the surgical procedure on the degree of pathology in the individual case. With this fundamental idea in mind the least radical surgical procedure should be adopted, which will accomplish the correction of the pathologic condition. In other words, if a dilatation and curettage and Hunner cauterization will relieve an endocervicitis and erosion, why do an amputation? On the other hand, if we are dealing with a large, chronically inflamed cervix of long standing with deep-seated infected glands, why limit the operation to dilatation and curettage and Hunner cauterization? In such a case the operation is entirely futile because the underlying pathology is not relieved.

DISCUSSION

DR. HILLIARD E. MILLER.—For over eighteen months I have been using Hunner's method of cauterization with excellent results. For recent erosions of the cervix due to lacerations from childbirth I think there is nothing better than the cautery. Unless such conditions are corrected within two or three months after their occurrence they are apt to bring about extensive cystic changes in the endocervical glands. The use of the small cautery will keep down granulations, which are really due to the proliferation of the columnar epithelium from the cervical canal, so that the squamous epithelium from the vaginal side can heal over it. The result is that although the lacerations are left there is no erosion and no eversion. If such conditions are not corrected, the acid secretions from the vaginal vault are apt to cause continual irritation, and low grade inflammations and cystic changes are the result. Today we are doing very few amputations of the cervix, particularly in young women. To my mind they are never very satisfactory until a woman has passed the menopause. When they are necessary, however, we find the cautery most helpful in preparing the ground for operation and making more conservative procedures possible.

DR. GEORGE MAYER.—I, too, am enthusiastic about the cautery in diseases of the cervix, and there is one point I should like to emphasize particularly, that there is no possible chance of a stenosis afterwards. I have been using this method extensively in young women both at the office and at Charity Hospital and my results have been uniformly good.

DR. GELPI (closing).—The points I want to make are these: conservatism should be the rule from the beginning. Where the main trouble is due to a laceration which has resulted in hypertrophied lips, then the proper procedure is to restore the cervix by trachelorrhaphy. If the trouble is superficial and the erosion and eversion are slight, then Hunner cauterization is ideal and you need have no fear of stenosis. You can go down half an inch into the tissues and all the way around like the spokes of a wheel and the results will be excellent. The epithelium will be denuded and you will be surprised at the beautiful, clean, smooth healing. But if you are dealing with a large cervix with deep seated glands and much infiltration, then cauterization alone will not reach the seat of the trouble and some form of amputation is the only remedy.

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DR. HILLIARD E. MILLER read a paper entitled **Version, Its Indications and Contraindications.** (For original article see page 241.)

DISCUSSION

DR. PHILLIPS J. CARTER.—I believe there is a definite indication for version in certain selected cases, particularly in primiparae with the masculine type of pelvis, funnel-shaped, where the spines and crests show a difference of ½ to 1 cm. and the true conjugate is about 8 cm. I recall one case particularly in which I did a cephalic version at eight months. It was a breech presentation and I am certain that I should have lost the child had I allowed it to continue as such. As it was, the results were excellent; I applied mid forceps after the head had been arrested for an hour and secured a living child. In another instance I did a cephalic version at the onset of labor.

DR. JOHN F. DICKS.—I agree fully in all but one point—when I am considering version I pay a good deal of attention to the length of time which the membranes have been ruptured. I think that we cannot emphasize too strongly the importance of what are too often regarded as unimportant matters, such as careful emptying of the bladder, complete surgical anesthesia, an assistant who understands the mechanism of labor, and a slow delivery of the after-coming head. In version and extraction in primiparae particularly, episiotomy is a distinct aid to delivery; in fact, I do not believe it should be attempted in any case before a fairly deep episiotomy has been done. I know I have saved many children by this procedure. Dr. Miller stressed especially, gentleness and deliberation in the delivery of the after-coming head. I am heartily in favor of Potter's technic at this stage. If it is carefully carried out the baby frequently cries before the head is delivered and it is obvious that after the mouth has been brought to the vulva haste is not essential. Ordinarily I am in accord with Miller's position about cephalic version not only because of the improbability of the head engaging immediately and satisfactorily in the new position but mainly because I consider the average breech delivery perfectly safe as a breech. Certainly this is in line with modern obstetric judgment. Moreover, I have seen more than one instance in which the new position was faulty and delivery by vertex presentation was accomplished with more difficulty than the original breech presentation could possibly have caused.

DR. J. W. NEWMAN.—I thoroughly agree with Dr. Miller in his attitude against promiscuous version. It is unfortunately being done very frequently today by both the skilled and the unskilled man, the general practitioner and the specialist in obstetrics. One cannot be too emphatic in the denunciation of such a procedure when it is done either on no indications at all or when the indications are manufactured. I am in hearty accord with what has been said about high forceps. I can think of no condition in which such a procedure is justified and it is never permitted on my service. I do not agree with Dr. Miller that we should decide which hand to use in bringing down the foot by the position of the

child's feet in relation to the mother's body. The man who ordinarily uses his right hand ought not to use his left unless he is ambidextrous. More than once I have seen an attempt to follow this rule end in failure because the obstetrician was trying to use his left hand when he was accustomed to do everything with his right. The choice of the foot is unimportant. If an arm should prolapse we never attempt to push it back; the risk of infection is too great after it has been exposed in the vagina and the result is usually too unsatisfactory. We put a loop of sterile tape around the arm and keep it down by traction as we make traction on the feet. Swinging the child's body upward over the mother's abdomen to aid in the delivery of the arms is an excellent point theoretically but it must be remembered that if it is not done very carefully serious damage may result to the child. When I first went into the Lying-In Hospital in Berlin this was the common practice but so many fractures of the clavicle and humerus resulted that it was ultimately abandoned. It is a mistake to insert the whole hand and try to jerk the arm down. Insert two fingers and sweep it down. This is one instance in which the arm used must correspond to the arm we are attempting to deliver. Another point which should be emphasized is that in the delivery of the after-coming head all traction must be upon the shoulder and never made by the finger in the mouth. That is introduced solely for purposes of flexion. I have seen more than one baby whose mouth was practically torn to pieces because this simple point had not been observed and who eventually died of inanition because it could not nurse.

DR. T. B. SELLERS.—I believe that the necessity of a deep ether anesthesia in all abnormal obstetric procedures cannot be emphasized too strongly.

DR. E. L. KING.—I wish to emphasize the use of version in cases of placenta previa, particularly after preliminary dilatation with the bag. It gives the best results so far as the mother is concerned, and while cesarean section, which is often advocated, undoubtedly at times gives better results for the baby, the arguments in its favor as a rule are fallacious because such babies are so frequently premature or exsanguinated that the mother's interest should always be paramount. It is almost a routine procedure in our cases of placenta previa at Charity (service of Dr. C. Jeff Miller) and our results have been excellent. I agree that episiotomy should be done in all primiparae, particularly if the version is to be followed by immediate extraction. I feel that I have saved many babies by making traction on the head with forceps rather than exerting excessive force on the neck. Of course the head must be fairly well down, as the high application is never permissible and particularly in such instances as this. I take issue with Dr. Miller and Dr. Newman on the question of inserting the whole hand into the vagina. I have had cases in which I could not get the posterior arm down with two fingers but the introduction of the whole hand brought it down at once.

In connection with version I might mention that we have had at Charity Hospital on our service in the last two months two cases of spontaneous version from breech to vertex before labor began. One was a multipara who has already delivered, the other is a primipara with a slightly contracted pelvis who is still awaiting delivery. Both cases were diagnosed as breech on admission, both by examination and by x-ray, and both turned spontaneously. The occurrence of the version in the primipara has been checked up by examination and x-ray, and the multipara, as I stated, has already delivered.

DR. W. E. LEVY.—In connection with Dr. Newman's warning against the danger of using the fingers in the mouth for traction in the Mauriceau-Smellie-Veit maneuver, I would say that for my own satisfaction I have recently taken

two stillborn feti (neither of them were delivered by version) and tested the effects of traction made by the fingers in the mouth. In both cases with very little effort I tore through the cartilaginous lower jaw and since then I have been even more careful than I was before when this maneuver is employed.

DR. MILLER (closing).—Commenting on Dr. Newman's statement about the danger of swinging the feet up over the mother's abdomen, I would say that deliberation is essential. Swinging is perhaps not the right word. The feet should be lifted up after the scapulae are showing at the vaginal outlet, which permits easy delivery of the arms. I do not mean to be dogmatic about which hand should be introduced to grasp the foot. The assistant is the most important person in the delivery of the after-coming head. Fortunately, I might say, after you have done a version your hand and arm are pretty well paralyzed and you cannot use much force, therefore, your assistant deserves most of the credit for the delivery of the head.

DR. W. E. LEVY reported a case of Preeclamptic Toxemia Complicated by Pyelitis and Pulmonary Disease.

Mrs. H. L. L., primipara, twenty years of age, was admitted to Touro Infirmary (1-1-25), with a diagnosis of preeclamptic toxemia. She had been having headaches and blurred vision and at the time of admission was markedly edematous generally; her blood pressure was 178-122 and she had 10 per cent of moist albumin. The estimated date of confinement was February 7. Routine tests showed a normal phthalein output, 58, a high diastatic activity, 32, and practically negative eyegrounds. I might say that this is strictly in line with a recent article in the Jour. Am. Med. Assn. by Cheney of Boston, in which he makes the point that in true eclampsias the changes in the eyegrounds are negligible whereas in true cases of nephritis they are marked.

The patient was put on expectant treatment, nonprotein diet, free purgation, forced fluids, etc, and although she had no acetone or diacetic acid we gave her glucose and insulin. When she failed to improve, medical induction of labor (quinine, castor oil and pituitrin) was attempted but was unsuccessful. Her general condition seemed fairly good but the blood pressure remained persistently high, ranging from 158 to 166, and the albumin also showed a progressive increase. When the albumin suddenly reached 65 per cent, it was decided that expectant treatment was no longer justified and under light gas anesthesia catheters were inserted. Twenty-four hours later, in spite of repeated small doses of pituitrin, labor had not set in, therefore, the catheters were removed and a Voorhees bag inserted without difficulty, but it broke as it was being distended. There was nothing left to do but rupture the membranes and precipitate labor. Pains began a few hours later and dilatation progressed rather slowly but quite satisfactorily. Twenty-four hours after the membranes had been ruptured labor was ended by low forceps. The child was alive and in good condition in spite of its prematurity and the overwhelming toxemia of the mother.

On the day of delivery the patient had a sudden elevation of temperature to 101.8.° This did not persist, her blood pressure dropped to 133-90 and the albumin to 5 per cent, and apparently she was making an excellent recovery when on the sixth day after delivery her temperature rose suddenly and sharply to 106° and she had a severe chill. In view of her previous toxemia, the intrauterine manipulations to which she had been subjected and the accident as the bag was being inserted, there seemed no doubt that infection was present. The blood count, however, showed only 9,400 leucocytes and 88 per cent polyps. A blood culture was

taken at the same time and the organisms were stated to be, morphologically, colon bacilli. Instead of waiting for confirmation I gave the patient a mercurochrome injection (20 c.c. of 1 per cent solution estimated on the body weight). Next morning to my consternation the final report was negative for pathologic organisms. The patient had a marked diarrhea but no chill or other reaction.

The temperature continued high, from 103° to 106°. Vaginal examination showed no local trouble. Both kidneys were found involved in a pyelitis, B. coli being the infecting organism. I might say here that although mercurochrome is supposed to be of value in kidney complications it certainly had no effect on this patient. She was treated with kidney lavage on both sides and, as is our routine in such cases, the catheters were left in for several hours each time.

Following this treatment the temperature came down and the patient's general condition improved under forced feeding, fresh air, etc. Then she developed a cough and began to have an afternoon rise of temperature every day to 101.° She was then pronounced definitely tubercular, confirmed by x-ray examination although repeated sputum examinations failed to reveal acid fast bacilli. She was discharged from the hospital in good condition (2-15-25), although she was still having temperature elevations to 99.° The patient subsequently made a complete recovery.

The case not only illustrates a rather remarkable recovery but also several diagnostic and therapeutic points. Infection seemed so obviously the diagnosis in view of the mode of delivery that when her temperature rose sharply we acted on that diagnosis, and, as I stated, even treated her with mercurochrome on what proved to be an erroneous laboratory report. The expectant treatment for the toxemia was thoroughly unsatisfactory and interference was indicated perhaps even before it was attempted.

The question of diastatic activity is interesting. Its value is purely prognostic but it is of vital interest to the patient to know whether she is going to emerge from her ordeal with permanently damaged kidneys or whether she can conceive again and bear children without risk to life. This woman is now free of albumin and casts and I am convinced that she is not a nephritic.

DR. T. B. SELLERS.—Dr. Levy's case emphasizes the necessity of close observation of all cases of preeclamptic toxemia. Whenever it is possible they should be in the hospital, where routine blood pressure determinations and urinalyses can be made at least twice daily.

DR. E. L. KING.—Preeclamptic toxemias of marked severity seldom reward us by treatment no matter how diligently we treat them. In mild cases, when the blood pressure runs from 140 to 155 and the albumin remains low and the urine plentiful, improvement is the rule. When the blood pressure is over 160 and the albumin is high, induction of labor is necessary as a rule sooner or later and generally it should be sooner. Induction by catheters is never very successful. Both preeclamptics and eclamptics about the seventh month of pregnancy are very difficult to start into labor and I have seen catheters remain in place twenty-four or thirty-six hours without effect, after which they had to be removed and other methods employed. Patients suffering with preeclamptic toxemia may be practically blind and yet show little change in the eyegrounds but when albuminuric retinitis appears the case is a true nephritis and the indication is urgent for immediate termination of pregnancy.

NEW YORK ACADEMY OF MEDICINE

SECTION ON OBSTETRICS AND GYNECOLOGY

MEETING OF APRIL 28, 1925

DR. S. D. JACOBSON reported a case of **Postmortem Cesarean Section with Living Child in a Patient Dying During an Eclamptic Convulsion.**

At least four minutes had elapsed after the woman was pronounced dead. The baby was deeply asphyxiated but successfully resuscitated with a hypodermic injection of "lobelin." I have found in medical literature references to 24 cases of this kind among which twelve infants survived the sixth day.

DISCUSSION

DR. JAMES A. HARRAR.—There are not many successful cases in the literature, but there is no question that there are a great many unsuccessful ones which are not reported. On account of the commotion attending the catastrophe to the mother, the doctor is very prone to neglect the opportunity of doing a postmortem cesarean at once, and the only chance of success is by doing it very promptly.

My case was done seven minutes after the mother died.

At the time I presented my paper before this Society Mr. Whiteside, the attorney for the County Medical Society, expressed his opinion that it was not necessary to get permission from the family to do the operation and that a man would be perfectly justified and upheld in any law court if he did a postmortem cesarean without permission from the family.

I neglected to preface my remarks by asking the doctor what the condition of the baby's heart was, its rate and strength, while he was doing this resuscitation before he injected the lobelin.

DR. JACOBSON.—There was no attempt at respiration at all, not even a gasp from the baby. The baby was cyanotic, and there was just a feeble heart beat.

DRS. H. SHARLIT, J. J. CORSCADEN and W. G. LYLE presented a paper entitled **Symptoms Associated with the Menstrual Cycle and the Effects Thereon of Ovarian Therapy.** *(Read by H. Sharlit.)* (For original article, see page 246.)

DISCUSSION

DR. JOHN ROGERS.—It is far simpler to point out the clinical indications for ovarian therapy than it is to point out its physiologic action. The only cases in which I feel reasonably certain that ovarian feeding will help are functional dysmenorrheas, and I believe the old congestive and obstructive dysmenorrheas due to misplacements of the uterus, etc., are very much overestimated. The dysmenorrheas and the neuroses are the ones which fall into this group, and outside of that it is very difficult to lay down any group in which ovarian feeding will help, except, in all probability, the cases with an accompanying hypo- or apparent hyperthyroidism of a moderate degree of severity.

The exact physiology of the disturbance is excessively difficult to explain. For a good many years it seemed to me the most foolish sort of therapeutics I had

ever heard of was to administer ovarian material to a woman with pain.   Lately I have come to believe it is fairly specific if you can pick out the cases.   The dysmenorrheas and the amenorrheas, often with the associated neuroses, are the groups of cases which offer the best hope.   The physiology is apparently connected with the pituitary and the thyroid.   We can only judge the pituitary clinically by the very vaguest sort of symptoms.   The thyroid is quite easily connected with it.

The different forms of this medicament are the next important things to consider.   The doctor mentions particularly whole ovarian feeding.   I have recently been interested in a good many experiments which seem to show that the corpus luteum by mouth is inert.   Corpus luteum by hypo has a very definite action. The interstitial tissue seems to be active by mouth or by hypo.

Dixon, of California, demonstrated that the injection of ovarian substances into the circulation stimulated pituitary flow in the spinal fluid.   This seemed to be at first a very remarkable specific, but lately some of my associates have shown that it is not as specific as Dixon intended to show, although it clinically seems to affect the pituitary body.

Giving whole ovarian substance by mouth has disappointed me in a great many cases because of gastrointestinal derangement.

As to the probable efficacy of corpus luteum by mouth I have come to rely largely on the interstitial tissues instead of corpus luteum.

As to the indications of corpus luteum by hypo, I have given it up.

DR. A. J. RONGY.—From a purely clinical standpoint, I think we are groping in the dark as far as the entire question of endocrinology is concerned.   When organotherapy was introduced some ten or twelve years ago commercially, naturally the wave of enthusiasm had to swing forward, and it is probably a good thing that it did swing forward because, after all, we can only establish clinical facts after they have been used in conjunction with therapeutics.   Personally, I practically gave up the use of any of the organic extracts except possibly thyroid because I found them of no avail.   In cases of sterility, of course, they are absolutely useless.   In cases of dysmenorrhea, where practically all our hope, as far as relief was concerned, was concentrated or directed, I found that in the hyperthyroidism type, Dr. Rogers pointed out, that occasionally the patient is helped in proper dosage.   The relief, however, is but temporary, it is not permanent.

It seems to me that the trouble with organotherapy is that something is missed in the preparation of the drug, which makes it more or less inert.   Then, again, something in the digestive tract may spoil the effect of the extract.

I feel that at present as far as this method of treatment is concerned, we have no scientific basis on which to base our conclusions or deductions.

DR. SHARLIT (closing).—A clinician comes by his personal endocrinologic experience and the basis of what he finds in a bottle procured from some manufacturer. A man who is interested in discovering whether or not there are any therapeutic possibilities in a piece of organic tissue that we speak of as an endocrine gland, starts by preparing what he wants to use clinically or experimentally himself and what he has to say with respect to the possibilities of endocrine material really lends itself to an interpretation quite different from that to which the clinician can testify.

I have attempted to make analyses of endocrine products as they are sold today, and it is astonishing to find how different these are.   So, when one speaks of giving ovarian substance, one does not know what he is giving.   The label says ovarian substance, but does he know anything of what relation it bears to

the next bottle which reads ovarian substance? The reason is because people working with ovarian substance are not prepared to state exactly or do not know how the material should be prepared to preserve the ovarian effects in it. They either are unwilling to state or they do not know. The pharmacologist feels he has *carte blanche* to make it the way he feels like making it.

So far as the clinician is concerned, I think we have come to the point where we can say exactly how the product should not be prepared. In giving ovarian substance, one should not be satisfied with a drug unless it bears the label of "whole ovarian substance defatted," for if it is labeled otherwise it is a fraud.

One of the important things to do in the preparation of ovarian substance is to desiccate the gland properly and prevent decomposition of its fat. Rancid ovarian substance makes one sick unless defatted.

DR. ISADOR W. KAHN (by invitation) read a paper on **The Rôle of the Cervix in Sterility.** (For original article see page 254.)

DISCUSSION

DR. G. L. MOENCH.—In looking up the results of the Rubin test in 94 cases which we insufflated recently, I found 30 of them had cervicitis of moderate degree. Twenty had open tubes and 10 only had closed tubes. About 55 of our cases were insufflated three months or more ago, and among those 55, we had seven cases of pregnancy. Two of these are perhaps doubtful. Among the other five, there were three cases which had a cervicitis, and after this was completely cleared up, they got pregnant. All of the tubes, as I said before, proved to be open. Still I do not believe that the cervix should be rated quite as high as Dr. Kahn has stated, because the number of cases of salpingitis, if I remember rightly, of the last 27, 21 had closed and only six open tubes. We see any number of cervicitis cases with very marked erosions, very marked discharges, with erosions of the lips, with bad lacerations, but still those women get pregnant and they carry through without any trouble at all. Of course, some of them will abort.

I do not believe that in married women the bacteria of the cervix are of very much importance. I exclude, of course, gonococci or similar organisms, but in quite a little work I did upon the cervix and in which I did cultures and also used the various gonococcic media to grow them I have never succeeded in any case in finding gonococci. I have found all sorts of bacteria and perhaps in some cases the number of bacteria was more or less a criterion of the severity of the condition, but on the other hand in cervices which showed hardly any inflammation— just a mild cervicitis apparently—I found a huge number of bacteria. B. coli are practically present in every married woman if you look carefully for them. You will find them in the vagina and more or less in the cervix.

DR. A. J. RONGY.—I do not believe that transuterine insufflation is practiced today with the idea of curing sterility or with the idea of having women become pregnant as the result of the treatment. Transuterine examination or insufflation, or the Rubin test, is purely a diagnostic procedure. True enough, in a small percentage of cases where the tubes have been kinked, due to pressure conditions, and have become straightened out, that infinitesimally small percentage of cases may become pregnant as a result of the examination, but, primarily, it is a diagnostic procedure and not a curative measure.

Since Rubin suggested transuterine insufflation I believe I have carried out this examination in over 500 cases, and it is remarkable what rôle the tubes play in the causes of sterility. Now we find that only 30 per cent of the tubes are closed.

In the treatment of sterility so many problems arise that we must always take into consideration in order to treat a case intelligently the fact that primarily we have got to definitely establish that the husband is potent, but not from a laboratory report.

Practically all married women have a cervical discharge and to put down cervical discharges as causative factors in sterility, I think a mistake, for the simple reason that it will lead us to a false conception of sterility. We have now come to a realization of the fact that mechanical sterility does not exist, for the reason that when you can introduce a sound into the cervix there is certainly plenty of room for the spermatozoa. When a woman menstruates and the clotted blood comes down, there certainly is plenty of room for the spermatozoa to travel up.

As regards the operations on the cervix, I would say that they are treacherous, and are successful in only one-third of the cases.

We finally came to the conclusion that sterility is never of local origin, with a few exceptions. Sterility in 95 per cent of cases is of constitutional origin and as long as we get away from that conception so long are we going to fail in the treatment. There is something wrong, not with the cervix and possibly not with the body of the uterus, but with the ovaries or elsewhere which makes the patient sterile and prevents her from conceiving, and no amount of treatment in such cases, whether it is mechanical or therapeutic or medicinal, will do any good. A certain percentage of cases remain sterile, a certain percentage become pregnant and a certain percentage temporarily are sterile. This fact is best illustrated by this point: a woman is married, we will say, three years, she does not become pregnant, no matter what you do for her, the husband is examined and the spermatozoa are viable and three or four years later she becomes pregnant. Some constitutional readjustment takes place. Once more she will have a baby and then she will stop and be relatively sterile again for two, three or four years and then she becomes pregnant again.

What I want to bring out is this: that there is a phase of sterility which is of a temporary character and is caused by some constitutional disturbance in the patient for the time being and for some unknown reason a readjustment takes place and she becomes pregnant.

In the presence of sterility I believe that the more we keep away from the cervix, the more we keep away mechanically either from the uterus or from the cervix except to treat them on general sensible and sanitary lines, the better off our patients who suffer from sterility will be and the better results we will have. As long as we do not know about the constitutional dyscrasia that takes place in these cases, so long are we not in a position to clear up, medically speaking, the true etiology of the causes of sterility.

DR. KAHN (closing).—I do not rate the cervix too highly in the causation of sterility, but I simply wish to make a plea for a more detailed study of the cervix and its secretions. Transuterine insufflation has its place, and I am not trying to put it in the background.

As far as cervical discharges in married women are concerned, it all depends on what you call a discharge. You may say to a patient, "Have you a discharge?" and the answer she will make is that she hasn't; she does not see it externally, but on putting a speculum into the vagina and examining the cervix you will find a real discharge. Has she a normal or an abnormal discharge? That is the question. The term "discharge" covers a good deal. I feel that I like to specify the nature of the discharge, whether it be mucopurulent, mucoid, sanguineo-

purulent or what not. The fact that a married woman has a discharge does not mean that it is normal.

In regard to operations on the cervix, I thought I brought out in the paper the fact that I condemned certain operations, such as the Dudley operation, for instance. The only operation I spoke of which we might do in certain cases is that of incising the cervix and sewing it up in the opposite direction.

I believe there is something in the constitutional origin of sterility. In a recent symposium at the Post-Graduate Hospital on sterility, I showed three cases which were treated by Zacom's mixture, which were finally delivered at the Lying-In Hospital. Personally, I believe that these cases which you call constitutional disorders are usually a thickened corpus in the ovary where the ovum itself is prevented from rupturing through the corpus and being carried in that way through the tube.

Dr. Jacobson wanted to know what I meant by erosion of the cervix. By that I mean that the stratified squamous epithelium has been replaced by columnar epithelium and the best way to decide whether you have an erosion or an eversion of the cervix is to paint the entire cervix with iodine. The erosion will not take the iodine stain; the rest of the cervix will. An eversion is an entire rolling out of the cervical mucous membrane. Cervical erosions in nulliparous women, as I said in the paper, usually date back to an old gonorrheal endocervicitis in childhood.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

THE FORMATION OF AN ARTIFICIAL VAGINA

BY FRANK A. PEMBERTON, M.D., BOSTON, MASS.

ENGSTAD[33] believes that congenital absence of the vagina occurs about once in 5000 cases. The percentage would be difficult to determine and his conclusion is drawn from his experience in practice rather than from definite figures.

The deformity is generally not discovered until after puberty, when the nonappearance of menstruation leads to investigation. Most of these cases have molimen consisting of indefinite pains in the lower abdomen at regular intervals. Rare cases have real definite cramps and these will be found to have a functioning uterus with hematometra.

The deformity is due to a lack of fusion and development of the müllerian ducts and is accompanied by undeveloped uteri varying from a single, solid, narrow strand of tissue to a double strand, more or less developed, at the lower end of each tube. The tubes are rudimentary. The ovaries are usually very nearly normal in appearance. Some writers describe a band of tissue, a peritoneal fold, running between the bladder and rectum. Very rarely a normal uterus is found but careful examination in these cases will usually reveal a sinus admitting a probe, where the vagina should be.

The external genitals have well developed labia, more or less of a hymen, and a depression in the site of the vagina of varying depth, usually 1 or 2 cm., the deepest reported being 3 cm. Separation of the bladder and rectum is fortunately readily done as this is the step common to all types of operation.

The majority show only the genital defect.[18] Occasionally there is a displacement or malformation of the kidney and it is wise to cysto-scope and x-ray the patient before operation in order to be certain of the location of the ureters.

These patients are described as being endowed with feminine characteristics, both physical and mental. The general formation of the body, distribution of hair, and facial features are feminine. They have normal female sexual feelings. Accordingly the discovery of a genital defect causes an exaggerated mental depression which is a marked feature in most cases.

Not infrequently attempts at coitus have resulted in the accidental use of the urethra instead of the vagina. The urethra is found to be markedly dilated. Schubert[22] reports a case in which a laceration

extended from the right lower edge of the external meatus up into the bladder with incontinence of urine as a result of coitus. He cured this and formed a vagina successfully by his method.

Care should be taken to differentiate these cases from hermaphrodites, both pseudo and true. If the patient has a hypertrophied clitoris and a mass in a labium which might be a testicle the operation should not be done until the real sex is known. Bab[9] discusses the report of a case operated on by the Baldwin method for the formation of a vagina. This was a school teacher of twenty-two who had been considered and lived as a female. The masculine characteristics were a large nose, slight panniculus, hair on the chest, a large clitoris, a testicle in the right labium, no uterus, no ovaries, and a masculine manner and voice. The feminine characteristics were the distribution of the hair on the mons veneris, normal labia, and a female urethra. He had been loved as of the feminine sex. At the time of the operation the mass in the labium was removed and proved microscopically to be a testicle. The operation was done under a misconception of the real sex and the patient unnecessarily castrated. Bab raises various questions as to what mental change would occur, whether an attempt should be made to transplant an ovary or testicle, and what civil rights the patient should have, into which we need not go.

Weibel[23] reports a case twenty-two years old with normal female sexual feelings who had hypospadias, with a hypertrophied clitoris. He operated by the Baldwin method and made a vagina. He found a very small uterus and hypoplastic ovaries. He did a homeotransplantation of an ovary two months later with no apparent beneficial result. Halban[32] reported two cases of pseudohermaphroditism in which he removed the gonads, which proved to be ovaries, and did homeotransplantation of ovaries to develop female characteristics. They both had molimena after this, and erections, which had occurred in one before operation, stopped, but otherwise there was no change. He believes that this procedure is not feasible because the sex is developed in the ovum, there being hermaphroditic as well as male and female ova.

It would appear wise, therefore, to give some thought to the sex and development of the sexual characteristics before making an artificial vagina.

The fundamental reason for making an artificial vagina is to relieve the psychic depression and feeling of inferiority with which patients having a congenital absence of this organ are afflicted. Several writers speak of the marked change from a melancholy to a happy temperament which results from a successful operation.[5, 12, 20] The secondary reasons are to allow coitus for those who have married before becoming aware of their disability and, with rather less indication, for those women who wish to marry. A further rare indication is in girls who have a functionating uterus and no vagina, in order to permit them to lead a normal menstrual life rather than have the uterus removed.

Some writers have raised a question as to whether it is ethical to make a vagina simply for the purpose of coitus when it is known that pregnancy cannot result. It seems evident from reading the histories of the patients that the psychic element always enters and, even after

the dangers are explained, they demand operation. It would be unwarranted to operate on these cases without explaining the difficulties, dangers, and results of the operation, both to the patient and any others concerned, relatives and prospective husbands. Miller[17] stresses this point especially.

According to Paunz,[26] Dupuytren made the first reported attempt at forming an artificial vagina in 1817. Villaume did one in 1823 and Amussat in 1832. These consisted in simply making an opening between the bladder and rectum which was not satisfactorily maintained. Heppner in 1872 made such an opening and lined it with flaps from the labia and thighs. Attention was then centered on trying various materials for lining the pouch, all more or less unsatisfactory. Liebl[13] and Paunz[26] cite the many different methods used. Free skin flaps and Thiersch grafts were held in place with packing. Strips of vaginal mucosa from other patients were tried. Intestinal wall from other patients and pieces of guinea pig intestine were unsuccessful. Hernia sac gave no better results. Ott tried drawing down the peritoneum of Douglas' pouch and attaching its edge to the new vaginal opening.

Stoeckel[4] reports a case in a woman twenty-three years old in which he made a new vaginal pouch, then did a laparotomy, opening the pouch from above, and had an assistant draw the peritoneum down and attach it to the outside while he closed Douglas' culdesac from above. The new vagina was kept dilated with packing, changed at intervals, for four weeks, but the final result was contraction and adhesion of the walls, leaving a vagina only 4 cm. long. He states that coitus was satisfactory.

The next real advance was an operation devised by Gersuny and reported in 1897. Schubert's[35] description of this operation is so clear that it may be quoted: "The canal which was to represent the artificial vagina was lined with a piece of mucous membrane which had been cut out from the rectum. He proceeded in the following manner: After having divided the perineum and the sphincter ani, he cut a strip of mucous membrane from the anterior wall of the ampulla without interrupting its connection with the rectum near the plica vesico-rectalis; this piece was then laid on the back wall of the bladder as far as the orifice of the urethra and here fixed by suture. The wound which was thus caused in the ampulla was closed by three rows of sutures, the margins of the wound having been loosened. The anterior wall of the artificial vagina was thus formed by a piece of mucous membrane from the rectum, while the surface of the wound, i.e., the anterior wall of the rectum which had been united by suture, formed the back wall. The sphincter ani was not united lest the strain due to evacuations should interfere with the course of healing of the sutures. A tampon covered with gutta percha paper was introduced into this artificial vagina in order to prevent the tract of the wound from cohering." This method was employed in four cases, three times by Gersuny himself and once by Puppel[2]. Excepting that his patients had to wear a dilator (a conical vulcanite plug) in order to prevent the vagina from narrowing, Gersuny obtained tolerably satisfactory results. Puppel was not so successful—a rectal fistula and a contraction of the vagina in consequence of tension of the tissue produced a total failure.

"There is no denying the fact that Gersuny's method shows a considerable progress in the formation of an artificial vagina in the case of absolute malformation; nevertheless, it proved insufficient. The fact that the piece of mucous membrane, which is covered with bacteria, is, during the whole length of the operation, in continual contact with the surrounding surface of the wound, renders a "prima intentio" of the suture in the rectum a doubtful thing. It is not to be wondered at that fistulae appeared in the cases of Gersuny and Puppel. The permanent wearing of a dilator in the artificial vagina is another detriment which ought not to be connected with an ideal operation. The dividing of the sphincter without its being united by suture is, in most cases, connected with a partial incontinence; i.e., patients will be able to retain evacuations of an ordinary consistency, but neither diarrhea nor flatus. Last, but not least, I do not think a vagina of the above description permanently suitable for coition."

Sueguireff[36] devised an operation which should be described for completeness and condemned. He divided the rectum and made an artificial anus at the lower edge of the sacrum, closed the upper end of the lower piece of rectum, made an opening from the vulva into this piece, and stitched the edge of the rectal wall to the new introitus so that the lower part of the rectum was used for coitus. This left the patient with an artificial anus, an abnoxious condition to say the least.

The next real advance was Baldwin's method which he suggested in 1904[37] but could not carry out until 1907.[38] In 1904 he saw a patient who had lost her vagina, except for a sinus, as a result of sloughing following childbirth. He planned to make a new vaginal opening and then do a laparotomy to resect a piece of ileum which was to be drawn down, still attached to its mesentery, to form a lining. The first part of the operation was done and the rest left for a second stage but the patient refused to have the procedure completed. In 1907 he had a similar kind of case in which the whole operation was done. He had made many observations during operations as to the amount of slack in the ileum and sigmoid and had found that parts of either might be used to be drawn down to the vulva. His description of his first operation contains the essentials and may be quoted.

"I carried out this procedure March 22, 1907, in all its details on a patient aged thirty-eight, who some eight months before had been delivered by forceps of her first child. Following the delivery there had been complete sloughing of all the vaginal tissues. All that was left was a sinus so small and so tortuous that it could not be followed by the finest probe. The patient was menstruating with great pain, owing to the difficulty of extruding the blood through this tortuous canal. She was in fairly good flesh, so that any abdominal operation would be attended with more than the average technical difficulties." In making the new vagina the parts were separated with a good deal of difficulty owing to the amount of cicatricial tissue present, and the rectum was accidentally wounded. The wound was closed at once with fine catgut, and gave no further trouble in the progress of the case. The details of the operation were carried out, as had been previously planned. On opening the abdomen some pelvic adhe-

sions were found, which had to be separated. The uterus was found in a normal condition, but a double hematosalpinx was present. On the left side the ovary was somewhat enlarged and intimately connected with the corresponding tube. This ovary, therefore, and both tubes were removed. The culdesac was then opened, but absolutely no portion of the vagina was present. The artificial passage which had previously been made was, therefore, enlarged and extended freely. A loop of small intestine (the lower end of the ileum, as this seemed to have the greater freedom of motion) was then seized with forceps, introduced through the vagina, and having been detached from the rest of the bowel was drawn down into the new canal, the continuity of the intestine being restored by means of a Murphy button. As the uterus was rather fixed in position so that it would be quite difficult to attach the cervix to the bowel in making the new vagina, and as the uterus would have no function further than the carrying on of menstruation, it was removed in the usual way, leaving the right ovary. The peritoneum was drawn over the floor of the pelvis so as to leave this intact.

"Healing of the abdominal incision took place by first intention, and the tissues in the perineum united with equal promptness, except at the point where a drainage wick had been passed from above down. This healed as soon as the drainage wick was removed. The entire series of operations required two hours, but in a patient with thinner abdominal walls, and with the experience gained from this case, the time could be very materially reduced.

"May 1, the septum between the two vaginas was cut with scissors, light packing introduced, and the patient returned to her home May 4 in excellent condition. The Murphy button passed on the tenth day after her operation. August 18 the patient consulted me and was feeling perfectly well. All her pelvic symptoms had subsided, and her only complaint was that occasionally her bowels were a little loose and that there was at times a little difficulty in holding her urine. This difficulty she had had before her operation, so that the operation itself was not in any way responsible for it. Her power of retention was increasing, and will doubtless ultimately be entirely recovered. Vaginal examination showed everything in fine shape. At the extreme upper end of the vagina I could make out a septum, the remains of the original septum formed by the two intestinal walls. The new vagina seemed to be absolutely normal in every way, so that I think no one in making a vaginal examination would have suspected any abnormality. The vagina was capacious in every particular, and showed no evidence of any cicatricial contraction.

"With this lapse of time, therefore, since the operation, and with the excellent local conditions which are present, I believe the operation in this instance may be accepted as having been entirely successful. The operation is not one which should be undertaken by a tyro in abdominal surgery, since the operator should understand thoroughly what the different steps of the operation are, and how to carry out promptly and accurately the proper technic. The experienced surgeon, however, should have no special difficulty in carrying it out in all its details, and with no more risk than that attending any other abdominal operation of average difficulty."

At about the same time Mori,[35] in Japan, used a procedure similar to Baldwin's except that he drew down a single end of a piece of ileum to the outside instead of the loop.

Next in 1911 Schubert[39] reported his method of using a piece of rectum instead of ileum for the new vagina. His latest description of his technic may be found in reference[14] and is as follows: The patient lies in the right Sims position. The mucous membrane at the new introitus is excised first, then the sphincter ani is dilated and the anal mucous membrane is incised at the skin edge and freed all around and upwards for 5 cm., its lower end being closed and held with four stitches cut long, a sponge on a clamp being left inside. An incision is made over and down to the coccyx, which is excised. The aponeurosis of the levator ani and the fascia of the pelvic diaphragm are opened by an incision starting 2 cm. from the middle at the lower end and running up to a point 1 cm. from the middle at the sacral end. The visceral fascia of the rectum is incised in the same line. This must be done in order to separate the rectum from the bladder easily as this fascia encloses both organs. Then the rectum is mobilized and separated from the bladder by blunt dissection, and freed from its attachments up far enough to draw out a loop so that a piece 10 to 12 cm. long may be cut off to be used for the vagina and still allow the end of the rectum to be sutured in the anus. The rectum is accordingly clamped and cut through, the upper end of the free piece closed and sutured to the iliosacral ligament of fascia in the upper end of the wound and the lower end is freed from any remaining attachments. An opening is then made from the new introitus into the sacral wound and the lower end of the section of intestine is drawn into it by the long holding sutures. The sacral wound is closed to a gauze drain, the end of the rectum is sutured in the anus and to the skin, and the new vagina is sutured into its introitus and cleaned out.

At the present time it may be concluded that there are three methods which may be used, Baldwin's, Schubert's, and the method of turning in attached flaps of skin. The last is the least dangerous but is the most unsatisfactory. Graves,[19] Jewett,[27] and Charbonnel and Favreau[30] have written good descriptions of the procedure. Graves method is as follows: "A transverse incision, about two inches in length, is made across the space usually occupied by the introitus. With blunt dissection a plane of cleavage is sought beginning just above the commissure of the levator ani muscles. It will be found that the tissues may be separated with comparative ease. Some bleeding is encountered, so that it is necessary to proceed cautiously with the separation. In this way an opening is made which corresponds in its proportions to a normal vagina. It is important not to enter the abdominal cavity. Several catgut sutures with long ends are placed in the vault of the new opening and the ends tucked into the pouch for later use, as will be described. The second part of the operation is to line the opening thus formed with skin turned in from the surrounding parts. This may best be accomplished in the following manner: The labia minora are first partially amputated, the incisions beginning near the clitoris and continued downward toward the artificial opening, but leaving sufficient pedicle to allow

competent circulation. The skin layers of the partially amputated labia are then separated so that they appear as two paddle-shaped flaps. Two similar flaps are then dissected from the thighs. A third, and if need be a fourth, may be taken from the buttocks, as shown in the drawing. In outlining the skin-flaps it is important to mark the pedicles of the paddle-shaped areas in a curved direction. By observing this rule the flaps may be turned face outward without causing disagreeable folds at their attachments near the artificial opening. The skin wounds made by the removal of the flaps having been sewed, a glass form, such as is used for maintaining a dilatation of the vagina, is placed at the artificial opening, but pointing outward, the five or six skin-flaps are then sewed together over the glass form, the flaps being turned so that the skin surfaces face externally. Great care should be taken to secure accurate coaptation of the skin edges, and to fit the cap of skin smoothly over the glass form. When the sewing of the skin-flaps has been nearly completed the ends of the sutures that had been attached to the vault of the artificial pouch are now brought out, threaded into needles, and passed through the dome of the cap made up of skin flaps. By carefully inverting the cap the artificial pouch becomes lined with a layer of skin which may be fastened snugly in place by tying the sutures that had been placed in the vault. The final step in the operation is to close with fine catgut sutures the remaining openings in the skin-flaps at the introitus.

"The patient upon whom I first operated was married soon afterward. That the operation was successful is attested by the fact that ten years later the husband called on me to express his gratitude and satisfaction for what had been done for his wife."

Graves says, however, in a personal communication, that in another case the vagina contracted and the result was a practical failure. Charbonnel and Favreau[30] use a similar method but say that the end-result is not first class, there being a vagina only 6 to 8 cm. long. Jewett[27] gives a good description of the use of only two skin-flaps from the inner sides of the thighs. The objection to this plastic method then is that there seems to be so much contraction that the final result is unsatisfactory in too many cases to make it a useful procedure. It might be tried first because of its lesser danger and, if unsatisfactory, either of the other methods could be used later.

The technic of Baldwin's method has changed from his original description and has been varied in some ways. Intestinal suture is now used to reestablish the lumen of the intestine instead of the Murphy button. The piece of ileum resected is usually near the cecum and is from 15 to 20 cm. long. Chaton and Constantini[15] tried a piece 30 cm. long and found that the loop could be drawn down to the vulva without incising the mesentery. This is especially valuable in case the mesentery is very thick with fat because then the tension of the mesentery is greater.[25] One of the essentials is that the blood supply to the transplanted loop must not be cut off by incising the mesentery too deeply or by putting it under too much tension. After suturing the loop in the introitus it may be opened immediately or after a few days. Paunz[26] opens it on the eighth day. Drainage is usually omitted now.

Mori's method of using a single limb of intestine forms a satisfactory vagina according to those who have tried it but it puts more

tension on the mesentery and there may be necrosis of the lower end.[1 & 25] Where a loop is drawn down the mesentery has to come down about 5 centimeters less than where a single piece is used so there is somewhat less tension on the blood supply.[13]

If the ileum is not lax enough to be available the sigmoid may be tried as first suggested by Baldwin and carried out by Wallace,[8] Albrecht,[13] Boldt,[13] and Ruge.[13] The technic is essentially the same.

There are a number of complications which may occur. First those common to any intestinal resection and anastomosis, peritonitis and wound sepsis. There seems to be a considerable mortality among the cases done in Europe. Schubert[6] collected thirty-two cases up to 1921 with a mortality of four (12.5 per cent). Two of these deaths were due to peritonitis and two from gangrene of the transplanted intestine and sepsis.

Daniel[16] was able to find 79 cases reported with a mortality of 17.5 per cent. There are comparatively few reports of successful or unsuccessful cases in the American literature. Baldwin, in a personal communication, says that he has done at least fifteen cases and has had only one death. He says that it is "not an operation for any surgical tyro" and that "the mortality of the procedure should be that of an intestinal resection, no more and no less, since the perineal part of the operation involves no important structures."

Engstad[33] has done nine with no mortality but believes that the operation is difficult and dangerous. Therefore, we may conclude that Baldwin's method should be used only by the experienced surgeon. It is interesting to note that the thirty-two cases collected by Schubert[6] having a 12.5 per cent mortality, were operated on by twenty-two different surgeons so that no one of them had an opportunity to perfect his technic.

A common complication is contraction of the introitus but this is easily overcome by dilatation. Less common is contraction at the upper end.[1]

A profuse discharge from the new vagina is noted by some, but it always stops eventually.[25] It may cause eczema when present.

The end-result is nearly always good. That is, there is a vagina admitting two fingers which allows coitus without discomfort.[1, 17, 20]

There are a few modifications of the Schubert technic. Strassman[12] does not incise the anal mucous membrane at the skin edge, he leaves a cuff of rectum 3 to 5 cm. long attached at the anus, taking his intestinal segment that much higher up, because he believes that the nerve innervation of the sphincter is less likely to be disturbed and, therefore, incontinence will not follow. Scheffezek[3] opens the peritoneum in some cases to facilitate drawing down the rectum. Rosenstein[3] sutures the rectum to the anus with silver wire because he believes there is less chance of leaving little folds in the anal canal which may be a cause of incontinence. Stoeckel[4] believes that some of these patients have what might be called an infantile rectum. That is, it is smaller than ordinary and perhaps such cases should not be treated by the Schubert method. Schubert[22] warns against drawing down on the septum between bladder and rectum in freeing the latter because it increases the danger of wounding the bladder.

An unfortunate complication in Schubert's method is partial incontinence of feces. He[6] and Stoeckel[4] describe it. The patient is

able to contract the sphincter by will power, however, so they feel that it is a result of lack of muscle tone due to over dilatation and not an interference with the nerve supply. On the other hand Futh[5] had it occur in a case operated on under sacral anesthesia in which the sphincter was not stretched because the anesthesia relaxed it. He feels that it is due to destruction of the nerve supply and that Strassman's method obviates this difficulty. The incontinence was cured by passing a strip of fascia around the sphincter to tighten it.[4, 5, 6] Sepsis in the sacral wound occurs at times. One rectovaginal fistula has been reported[6] in a case operated on by Strassman's modification. Contraction at the introitus occurs and, rarely, higher up also, but responds to dilatation.

The mortality with Schubert's method is undoubtedly lower than with Baldwin's. In 1921 Schubert collected thirty-three cases operated on by fourteen surgeons with no deaths, one poor result, and one fistula as mentioned above. In 1923 he collected fifty-three cases with no deaths and only three complicated by incontinence. In 1924 he reported a death from sepsis in a case which had a functioning uterus menstruating through a canal 1 mm. wide and 9 cm. long which had a pocket at the upper end around the cervix full of pus.

The end-results appear to be as good functionally as the Baldwin ones.

An interesting point is that the character of the lining of the vagina does not change, that is, there is no modification with the change in environment as is frequently found with epithelium. Neugebauer[1] has examined five Baldwin-Mori cases operated on 10, 9, 9, 8, and 1 years before and found the lining to be still of the intestinal type. Rosenstein[3] has found the same to be true six years after performing Schubert's operation. Also coitus does not seem to damage the lining as might be expected. It does not bleed and is not sensitive. Wagner[2] says that in a case of pregnancy following an operation by Schubert's method the introitus was of the usual bluish color, while the vagina was not, showing the influence of the nerve supply.

Finally the question of whether pregnancy can occur in case there is a functionating uterus to attach the artificial vagina to has been proved. Schubert[6] thought that the secretion from the intestinal wall might kill the spermatozoa.

As had been said it is rare to find a normal functionating uterus in these patients. Neugebauer[1] reports one operated on by the Baldwin-Mori method who had blood in her urine each month before operation and also for eight days after but in his description of the operation he says nothing about any connection between the well-developed uterus that he found and the bladder. He made no attempt to connect the vagina with the uterus. Pitha[14] operated on one by the Baldwin method, attaching the new vagina to the cervix, but she died of peritonitis. Schubert[14] operated on two by his method, one of whom menstruated after operation and the other died of sepsis. Dieulafe[23] had a patient with hematometra which he opened by making an incision between the bladder and rectum and sutured the edge of a cavity containing tarry blood to the outside skin. One year later she had a normal appearing vagina but he says nothing about menstruation or a uterus. Ward[32] operated on a girl thirteen years old who had had five attacks of pain like molimena at intervals of six

weeks. He made an opening between the bladder and rectum, peeled the cervix out of connective tissue, dilated it, and evacuated about one ounce of tarry blood. Six days later he did a Baldwin operation, stitching the intestine around the cervix with great difficulty from the abdominal side. He saw her one year later and found that the intestine had slipped down from the cervix so that the cervix lay above it. He resutured it from below.

The most interesting case is Wagner's.[2] He operated on a woman of twenty-seven, who had a rudimentary vagina 5 cm. long which would just admit a sound, by Schubert's method, attaching the new vagina to the cervix. She became pregnant and he advised a cesarean and planned to have her come in to the hospital for it ahead of time as she lived some distance away. However, labor came on early and was so vigorous that she could not be moved. She was delivered by her own physician, with a low forceps and episiotomy, of a normal baby weighing 2750 grams. Examination six months later showed a good vagina admitting two fingers with a little prolapse of the posterior wall.

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Selected Abstracts

Gonorrhea

Clodi and Schopper: The Prepuce of the Clitoris and Gonorrhea. Wiener Klinische Wochenschrift, 1922, xxxv, 197.

The authors found gonococci in the fissure between the clitoris and prepuce in three cases in which they could find none in the urethra, vagina and cervix. A search of the literature revealed very little in regard to this subject.

Further investigation in cases of from three days to one year since infection and in two positive cases one and a half and six years after infection, using smears and cultures, gave the results expressed in this table:

	PREPUCE	URETHRA	VAGINA	CASES
1	+	+	+	18
2	+	+	−	1
3	+	−	+	3
4	+	−	−	4
5	−	+	+	5
6	−	+	−	1
7	−	−	+	3

Therefore, twenty-six out of thirty-five cases (74.3 per cent) showed gonococci in this situation. In four cases they were found there only.

The usual finding in the smear from the prepuce consists of one to three, less often five cocci in a pus cell. Extracellular cocci are relatively frequent compared with other foci. They conclude that gonococci were found under the prepuce in 74.3 per cent of cases with gonorrhea on examination and that this finding is without doubt of the greatest importance in regard to infection and reinfection of their own genitals, thereby delaying a cure. In order to promote the cure of the disease it is necessary to cleanse this region and treat it with antiseptics as well as make regular microscopic examinations. FRANK A. PEMBERTON.

Lailey and Cruikshank: Complement Fixation in the Diagnosis of Gonorrhea in Women. Surgery, Gynecology and Obstetrics, 1921, xxxiii, 414.

While admitting the unsatisfactory results obtained heretofore with the complement-fixation test in gonorrhea, these authors seem to have obtained quite satisfactory results with an antigen developed by Thompson. A routine examination was made of the blood from all patients in the gynecological service of the Toronto General Hospital. Of 217 sera tested, 116 gave a positive reaction. In 80 per cent of patients giving a positive test, there was a discharge showing gonococci. All the rest had profuse vaginal discharge and some had other evidence of chronic gonorrhea, such as pelvic inflammatory masses. Of those giving a negative result, all had been considered either nongonorrheal or cured clinically. R. E. WOBUS.

Cherry and di Palma: The Diagnosis of Chronic Genital Gonorrhea in the Female.
Journal American Medical Association, 1921, lxxvi, 1572.

After extensive comparative tests, these authors come to the conclusion that neither the cutaneous tests, nor the complement-fixation test, are of any value in the diagnosis of localized gonorrheal infections.

Since the gonococcus is rarely found in these chronic lesions, the best guide to diagnosis is a reliable history of the case, together with the clinical findings.

R. E. WOBUS.

Weinzierl: Vaccine Diagnosis and Therapy in the Ascending Gonorrhea of Women.
Zeitschrift für Geburtshülfe und Gynäkologie, 1921, lxxiv, 496.

The author discusses the enormous sociologic importance of gonorrhea and the great increase in its incidence and the frequency and severity of its complications due to war conditions. The great multiplicity of therapeutic measures recommended is evidence that no one of them is entirely satisfactory. The author's review covers a series of ninety-six cases of gonorrheal adnexal disease treated by gonococcus vaccine, as well as a great many more to whom it was given as a diagnostic measure. Arthigon, a polyvalent vaccine containing twenty different strains of gonococci in a concentration of twenty million per c.c. was injected intravenously in graduated doses beginning with 0.2 c.c. and running up to 2 c.c. Repetition of the dose was gauged by the clinical reaction and was not done until two to five days after all signs of reaction had disappeared. No other treatment except bed rest was employed.

The author finds the vaccine a great diagnostic aid. In many cases of latent gonorrhea, continually negative to bacterial examination, in spite of repeated search and all the usual provocative measures, it became possible to demonstrate the organisms. The diagnosis is further confirmed by the reaction to the injection. These include local reactions, absent with the intravenous route of injection; focal reactions including temporarily increased pain and local heat as evidenced by the rectal temperature; and general reactions, including a characteristic fever curve and general malaise. The therapeutic effect is furthermore a valuable diagnostic sign. No single reaction is of itself valuable, but the occurrence of all in addition to a satisfactory cure speaks with certainty for the gonorrheal nature of the adnexal tumors. Strong positive reactions with little or no therapeutic effect bespeak a mixed infection. Lack of reaction and absence of therapeutic result, usually indicate that gonorrhea is not the cause of the adnexal disease, although old low grade processes or those walled off by dense scar tissue may be entirely refractory. In such cases one may occasionally prove the nature of the disease by the provocation of organisms.

The best therapeutic results were obtained in the treatment of gonorrheal adnexal tumors in the subacute stage, yet often the results were good in the chronic stages, even after all other therapeutic measures had failed. A high percentage of cases were discharged subjectively well and absolutely normal on pelvic examination. Two subsequently became pregnant. Treatment in the acute stage is to be avoided, as it seems to favor rather than inhibit the development of adnexal masses. Very old foci are not favorably influenced, nor are mixed infections and other nongonorrheal adnexal diseases. Vaccine is of no value either in diagnosis or treatment of the so-called open gonorrhea of the lower genital tract alone.

MARGARET SCHULZE.

Asch: The Treatment of Gonorrhea in Women. Therapeutische Halbmonatshefte, 1921, xxxv, 50.

The author believes that vaccine therapy alone is insufficient in the treatment of Neisserian infection in women but that such treatment should follow and supplement

any local treatment of the infected mucous membranes. Operative measures may in certain cases become necessary.   MARGARET SCHULZE.

Von Bueben: Diathermy in the Therapy of Female Gonorrhea. Deutsche Medizinische Wochenschrift, 1921, xlvii, 1427.

Since gonococci are killed at a temperature of 41° C., v. Bueben has employed diathermy in intractable cases of gonorrhea since 1910. By means of the apparatus employed, he is able to raise the temperature of the deeper tissues to 47° C. Exposures are made twice weekly and are continued for from fifteen to twenty minutes. After each menstruation the cervical secretions are examined for gonococci. If found negative, two subsequent examinations are made. The usual course of treatment consisted of ten applications, though some required more or less. In a series of 110 cases he achieved cures in eighty-six. Since these were all old cases which had resisted other forms of treatment, the results appear encouraging.

R. E. WOBUS.

Milner and Maclachlan: The Diathermy Treatment of Gonorrhea in Women. The Lancet, 1923, ccv, 652.

The basis for this work is found in the fact that the gonococcus is destroyed when exposed to a slightly prolonged temperature of 104° F. Using diathermy for this purpose, the authors treat gonorrheal lesions of the cervix, uterus, urethra and so forth, with excellent results.

In gonorrheal cervicitis the indifferent electrode is placed on the abdomen, the active electrode in the cervix.

In treating gonorrheal urethritis the authors caution against placing the active electrode in the urethra. By this procedure they avoid any danger of burning this region, and any resulting stricture.

Their technic and results are fully given in this article.

NORMAN F. MILLER.

Frank: Treatment of Gonorrhea in Women with Heated Sounds. Zeitschrift für Geburtshülfe und Gynäkologie, 1922, lxxxiv, 638.

The author reports results with the use of heated metallic sounds in the treatment of cervical and urethral gonorrhea in women. A temperature of 55° C. for twenty to thirty minutes was found most advantageous. The action is analogous to a Bier's hyperemia and is best combined with medicinal treatment. Results are best in the obstinate chronic cases and the method is an excellent provocative measure for the demonstration of organisms in old cases. From ten to thirty treatments are usually necessary. The method is not adapted to acute cases nor should it be used in the febrile stage of adnexal disease. Even urethral sounds are contraindicated during pregnancy since there is a great tendency to produce abortion.

MARGARET SCHULZE.

Mutschler: The Treatment of Gonorrhea of the Uterus with Medicated Rods and Celluloid Capsules, According to the Method of Pust. Zeitschrift für Geburtshülfe und Gynäkologie. 1924, lxxxvii, 300.

The author cites results in a series of forty-eight cases treated by the method of Pust—celluloid capsules applied to the cervix to produce hyperemia, combined with the introduction of rods of 5 per cent and 10 per cent protargol and 2 per cent and 5 per cent trypaflavine into the canal. He has found that by this method, it is possible to cure cervical and uterine gonorrhea in four to six weeks.

Of forty-eight cases, forty-four were cured. In two, treatment was not continued for a sufficiently long period. Two were uninfluenced by a period of treatment of from seven to eleven weeks.

This method of treatment led to cure in five cases which had been previously unsuccessfully treated for more than eight weeks, in one case for eleven months.

Adnexal disease did not appear as a complication more frequently than in other type of treatment.

These cases were all hospitalized, whether the method is adapted to ambulatory treatment must still be determined. MARGARET SCHULZE.

Treuherz: Dry Treatment of Gonorrhea and Fluor in the Female. Therapie der Gegenwart, 1921, lxii, 303.

Felix Mendel has described a powder for the treatment of suppurating wounds, that is composed of sodium bicarbonate 10, tartaric acid 9, sugar 10. Dissolving in the secretions, it effervesces and reaches the most remote recesses of wounds, and thus acts as a mechanical cleanser as well as an antiseptic and anesthetic. He has since noted the advantage of this preparation as a dry vaginal and cervical application for gonorrhea, in contrast to the fluid applications that are painful, do not reach all the diseased area, and are prone to produce salpingitis. He states that the substance is most effective when used in granular form rather than as a fine powder, and recommends a special blower for its application.

Treuherz has used this medication for three months in the old Lassar clinic and finds that a frequent result of daily application is the diminution of the discharge within a week and its disappearance within four to six weeks. For urethral use he applies the compound in bougie form. RAMSAY SPILLMAN.

Shutter, H. W.: The Treatment of Chronic Gonorrhea in the Female. Wisconsin Medical Journal, 1924, xxiii, 69.

The author recommends cautery treatment of chronic gonorrhea in the female, destroying the infection in the cervix, glands of Bartholin and the paraurethral glands of Skene. He reports good results in from one-quarter to two-thirds of the time required by less certain methods. No untoward results have followed the treatment. F. J. SOUBA.

Bonney: The Treatment of Neisserian Infection and Its Complications in the Female. American Journal of Surgery, 1923, xxxvii, 249.

Three hundred cases of gonorrhea were observed by Bonney over a period of sixteen years. He divides the cases anatomically and pathologically for the purpose of presenting the treatment. Acute and subacute infection of extrapelvic organs. No specific treatment prescribed. Chronic infection of extrapelvic organs. Bartholin's glands and the endocervix are treated with such remedies as 25 per cent solution of mercurochrome, iodine, phenol, etc. Refractory cases of endocervicitis. Treated by dilation and sharp curettage followed by electric cautery and drainage. The author points out the necessity of not entering the uterine cavity. Acute infection of the intrapelvic organs. Cystitis is treated with irrigations of silver nitrate in varying strengths from 1 to 5,000 to 1 to 1,000. Acute pyosalpinx is treated palliatively until the attack is over, when operation is the method of choice. In recurrent attacks involving the intrapelvic organs, operation is done after acute symptoms have subsided. Bonney speaks of the advisability of waiting for a menstruation in order to determine how much disturbance will be brought about by the natural congestion of the pelvic organs. WM. KERWIN.

Blaschko and Gross: To Determine Cure After Gonorrhea in Women. Deutsche
    Medizinische Wochenschrift, 1921, xlvii, 1202.

Every gynecologist knows how difficult it is to determine when a given case of
gonorrheal infection in woman may be regarded as cured. Even when after re-
peated examinations no gonococci can be demonstrated in the secretions, the woman
frequently infects her partner. Various aids have been proposed to determine a
cure. Among these the injection of gonococcus vaccine or even of a nonspecific
foreign proteid hold first place as they frequently cause a latent gonorrhea to light
up, thus making the diagnosis relatively easy. Unfortunately these measures often
fail. With the same object in view, Blaschko and Gross apply a 20 per cent Lugol's
solution locally. The solution is applied to the cervix by means of a cotton swab
which is kept in place for fifteen to thirty seconds. To the urethra it is applied
by means of a syringe and retained for from one-half to one minute, the bladder
being full. This method may be used alone or in conjunction with the vaccine
injection.

After this procedure, the secretions should be examined on several successive
days. If no gonococci are found, the authors believe, a latent infection may be
excluded with a considerable degree of certainty. They warn against using any
provocative measure in the presence of old tubal infections or within three weeks
after at least two examinations have been negative, these examinations to be pref-
erably made immediately after two menstrual periods.   R. E. Wobus.

Abraham: Tests for Cure of Gonorrhea in Women. The Lancet, 1924, ccvi, 429.

The author believes that gonorrhea in women may be considered cured when
certain clinical and bacteriologic requirements are fulfilled. Thus all clinical signs
of the disease must have disappeared and must remain so on repeated examinations.
All bacteriologic signs of the disease must be absent. This must include negative
bacteriologic evidence obtained not only from the urethra and cervix but also from
the anal canal. These examinations must be repeatedly negative.

In so far as the complement-fixation test is concerned the author believes the test
not sufficiently powerful to diagnose the disease in the early stages. In the middle
stage it will differentiate between gonococcal and nongonococcal disease and during
the convalescent stage he feels that it is too delicate for use as a practical sign of
cure.

If at the end of six months, without treatment, the patient shows no return
of clinical or bacteriologic evidence it may be assumed that the patient is cured.
If a repetition of the tests a year later still prove negative, the patient may safely
resume marital life.   Norman F. Miller.

**Lees: Some Observations on Gonococcal Infections of the Fallopian Tubes and
    Ovaries.** Transactions of the Edinburgh Obstetrical Society. Session lxxxii,
    1922-1923, p. 37.

The cervix and urethra are attacked simultaneously in fifty per cent of acute
gonorrheal infections. Urethral infections are more frequently secondary to cervical
involvement than the reverse. Gonorrheal vaginitis is seldom seen in the adult except
during pregnancy and the puerperium. When secondarily infected, smears from the
vaginal wall seldom reveal the organism. Tubal involvement, though usually due
to extension along mucous surfaces, may result from lymphatic or blood-stream ex-
tension from the lower pelvis. The usual exciting causes of tubal complications
are menstruation, coitus, careless manipulation during examination, exercise, alcoholic
excesses and factors lowering resistance.

Tubal involvement of gonorrheal origin is usually bilateral. When virulent strep-tococci and staphylococci accompany the gonococcus in the tubes the pulse rate and toxemia generally are out of proportion to the temperature. While cultures made from pus collections in the tubes seldom reveal the gonococcus, scrapings from the abscess wall yield a positive culture in a fair percentage of cases. The rupture of pus collections of purely gonorrheal origin usually occurs into the pelvis and not above. An acute gonorrheal infection of the tubes is not analogous to an acute infection in the appendix and almost never calls for immediate surgical inter-ference.

The treatment of tubal infection begins in prophylaxis. Rest during the acute stages of gonorrheal and later at the menstrual periods, will prevent a large per-centage of extension. Early meddlesome treatment is responsible for many cases. Treatment of the primary foci, cervix, urethra and Bartholin's glands should accom-pany the treatment of extensions. Antiseptic douches alone will not cure cervical gonorrhea. Operation during the acute stages of salpingitis is difficult, dangerous and usually unnecessary. Conservative treatment such as rest in bed, Fowler's posi-tion, ice over the abdomen, daily enemata and fairly large doses of sedative is usually all these cases require in the acute stage. When pain and temperature have subsided hot douches, careful local treatment such as iodine packs in the uterus and cervix, fresh air and hot hip-baths are indicated. In most cases the condition in the tubes disappears and surgery, if later necessary, may be only to free local adhesions. Gonorrheal salpingitis is inaccessible to local antiseptic treatment but in order to make certain that the original gonorrhea has been removed, resort to protein or chemicotherapy must be had. Removal of suppurating tubes is only the removal of the end products of disease and not a cure of the infective process in the rest of the genitourinary tract.   H. W. SHUTTER.

Valentin: Examinations in Gonorrhea of Children. Deutsche Medizinische Wochen-schrift, 1921, xlvii, 594.

Emphasizing the care necessary to obtain reliable results, Valentin gives her conclusions, arrived at by examining 161 girls from three to eleven years old, infected with gonorrhea. In practically all cases she found the urethra infected. Whether the bladder is actually involved or whether gonococci are found in the bladder only accidentally, is not determined, owing to the difficulty of cystoscopic examination in children. The cervix was found infected quite frequently, but always recovered without any special local treatment. The rectum was almost universally found to be infected, even though not producing marked symptoms. Bartholinitis was not encountered in this series.   R. E. WOBUS.

Valentin: Causes of Recurrence of Gonorrhea in Children. Deutsche Medizinische Wochenschrift, 1921, xlvii, 628.

She has treated 161 girls for acute gonorrhea. Treatment consisted in instilling one-half per cent protargol into the urethra once or twice daily by means of a medicine dropper, and distending the vagina with 1 per cent protargol by means of a gonorrhea syringe. One or more recurrences were noted in sixty-one of these children after they had been free from gonococci for from six to twenty-one weeks, except that persistent search always demonstrated their presence in the rectum. From these data, Valentin forms the conclusion that recurrences are practically always due to rectal gonorrhea and their prevention would depend upon devising a satisfactory method of attacking the gonococcus in the rectum. R. E. WOBUS.

Lauter: Rectal Findings in Gonorrhea in Children. Deutsche Medizinische Wochenschrift, 1922, xlviii, 1285.

That gonorrhea in infants and children is usually accompanied by an invasion of the rectum has been previously demonstrated, as well as the fact that reinfections of the vulva and vagina usually have their origin in the rectum. Lauter not only substantiated these findings, but demonstrated that, while there is usually no external evidence of the rectal involvement, examination with the rectal speculum usually reveals definite redness and often a filmy deposit which may resemble a diphtheritic membrane. Leucocytes containing gonococci are usually present, even in those cases which show no macroscopic lesions.

Lauter realizes the danger of infecting the rectum by means of the speculum, but thinks this can be obviated by irrigating with a 1 per cent silver nitrate solution after the examination. If gonorrheal proctitis is present, it should be treated to prevent reinfection and he feels that no such patient should be discharged as cured without a rectal examination having been made. For obvious reasons, the use of the rectal thermometer should be avoided as much as possible in these cases.

R. E. Wobus.

Stein: A Clinical Investigation of Vulvovaginitis. Surgery, Gynecology and Obstetrics, 1923, xxxvi, 43.

Stein calls attention to the fact that vulvovaginitis in children is not necessarily gonorrheal, in fact, of sixty-six children with vulvovaginitis examined at the Michael Reese clinic, only fifteen cases were definitely diagnosed as gonorrheal by the smears. In only one-half of this number was it possible to grow the gonococcus. In none of the doubtful cases was a growth obtained. The chief etiologic factor in the nongonorrheal cases appears to be lack of cleanliness, though various microorganisms play a very important part, e.g. the diplococcus catarrhalis. Gonorrheal infection, at times, appears in small epidemics, as the case cited by Skutsch, where 236 girls were infected in a public bath.

It is not always easy to determine whether a given case is gonorrheal or not. In chronic cases the smears do not always show gonococci and even under the most ideal conditions, cultures are positive in only 50 per cent of the clearly gonorrheal cases.

Stein treated these patients by the daily injection of 1 per cent mercurochrome ointment, taking his clue from Gellhorn who used a 1 per cent silver nitrate ointment. By this form of treatment, the gonorrheal cases cleared up in an average of 9.7 weeks; the suspicious cases in 6.5 weeks; and the nongonorrheal cases in five weeks. Two of the gonorrheal cases had a recurrence. He lays stress on the importance of a daily tub bath as an adjunct to local treatment, nongonorrheal cases being often cured by this means alone.   R. E. Wobus.

Schmidt, Willy: Therapy of Gonorrheal Vulvovaginitis in Children. Therapie der Gegenwart, 1922, lxiii, 144.

In a collective review of recent German literature, Schmidt notes that infection of the cervix is regarded as a rare complication. Despite the warning of Bumm, an energetic treatment of the (infected) cervix is instituted by Perrin and by Barnett.

Involvement of the urethra and bladder is regarded as frequent by many authors, and Bruschke and Arndt are among those who regard the urethral infection as prone to subside spontaneously.

Epstein's view that vigorous treatment is contraindicated in the acute stage is still accepted. Mild astringents, sitz baths, and rest in bed are generally regarded

as in order until the inflammation has subsided, then disinfection is undertaken with various silver preparations. Tampons, powder insufflations, and lactic acid tablets appear to have fewer champions than various trade-named bougies, suppositories, etc. Vaccine therapy is not unanimously recommended. Fever-treatment (hot baths) is not satisfactory with children. Diathermy has been recommended.

The prognosis of juvenile vulvovaginitis is regarded by many as favorable. Kjellberg-Romanus points out the fallibility and difficulties of follow-up examinations in later life. RAMSAY SPILLMAN.

Errata

June, 1925, issue, article by R. R. Huggins, second paragraph, page 819, concluding sentences should read as follows: "The mortality in our work from postoperative peritonitis previous to 1917-18 had been 0.2 per cent. Since that time it has doubled and has been 0.4 per cent." These figures were erroneously stated as 2 and 4 per cent respectively.

In the article by Dr. H. W. Mayes on the "Use of Mercurochrome in Obstetrics," which appeared in the July, 1925, issue, the concluding "Note" on page 69 should call attention to the fact the days of morbidity in the patients treated, were .29 of a day and .19 of a day respectively, and not .29 per cent and .19 per cent, as printed.

Notice

The continually increasing cost of manufacture has made it necessary that the subscription price of the Journal be increased. Beginning with October it will be raised $1.50 per year.

Better paper will be used, enabling us to bring out cuts more satisfactorily, and if necessary the Journal will be enlarged to accommodate the ever-increasing number of articles offered for publication.

THE AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY is now the most important and widely circulated journal on these specialties in the world.

Books Received

A TEXTBOOK OF SURGICAL HANDICRAFT. For the use of medical students. By J. Renfrew White, assistant surgeon and surgeon-in-charge of the orthopedic department, Dunedin Hospital, New Zealand, etc. New York. The Macmillan Company, 1924.

BEITRAEGE ZU PROBLEMEN DER GYNAEKOLOGIE UND DES KARZINOMS. Festschrift zum 70 Geburtstage und 50 jaehrigem Doktorjubilaeum des Hofrat Dr. A. Theilhaber. Berlin. Verlag von C. F. Pilger & Co.

PRÉCIS DE GYNÉCOLOGIE. Par André Boursier, professeur de gynécologie à la faculté de médecin de Bordeaux, etc. Troisième édition, revue, corrigée et augmentée par M. Auvray, professeur agrégé a la faculté de médecin de Paris, etc. Tome premier et second. Paris, Librairie Octave Doin, 1925.

INDICATIONS RESPECTIVES des pelvitomies et de la césarienne suivie d'extériorisation temporaire de l'utérus. Par le docteur Jules Scemla, ancien interne provisoire des hopitaux de Paris et de la maternité. Paris, Librairie Octave Doin, 1925.

GEBURT UND NACHGEBURT IM ROENTGENBILDE. Von K. Warnekros. Mit 31 Abbildungen im Text und 32 Tafeln. Muenchen, Verlag von J. F. Bergmann, 1925.

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DIE UNEHELICHE MUTTERSCHAFT. Von Dr. Egon Weinzierl, Assistent der deutschen Universitaetsfrauenklinik in Prag. Berlin und Wien, Urban & Schwarzenberg, 1925.